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ORIGINAL ARTICLE

Identifying and managing adverse drug reactions: Qualitative analysis of patient reports to the UK yellow card scheme

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Introduction: Adverse drug reactions (ADRs) can have significant negative impact on peoples' daily lives, with physical, economic, social and/or psychological effects. Patient reporting of ADRs has been facilitated by pharmacovigilance systems across Europe. However, capturing data on patients' experiences of ADRs has proved challenging. Existing patient reports to the UK Yellow Card Scheme contain free-text comments which could be useful sources of information.

Objectives: To investigate patients' experiences of ADRs and their impact on patients as described in free-text data within patient Yellow Card (YC) reports submitted to the Medicines and Healthcare products Regulatory Agency.

Methods: A qualitative review of narrative texts was conducted on free-text data from 2255 patient YC reports from July to December 2015.

Results: Three key narrative themes emerged from analysis of the free-text data in 2255 reports: (1) identification of ADRs, (2) severity and impact of ADRs, and (3) management of ADRs. Temporal associations were the most common method of identification followed by differential diagnoses and confirmation with information sources such as healthcare professionals (HCPs). A combination of explicit and implicit impacts were described: physical, psychological, economic and social effects often persisted and caused serious disruption to many patients' lives. A range of strategies were used to manage ADRs, including consultation with HCPs, stopping/reducing the medicine or taking medicines to alleviate symptoms.

Conclusion: Free-text data from YC reports has been an underutilised resource to date, but this research has confirmed its potential value to pharmacovigilance and medication safety research.

KEYWORDS

adverse drug reactions, identification, management, patient reports, pharmacovigilance, yellow card

1 | INTRODUCTION

Direct patient reporting of adverse drug reactions (ADRs) has been a key element of effective pharmacovigilance (PV) processes in recent decades. The contribution of patient reports to drug safety was

acknowledged and consolidated by European Union (EU) PV legislation in 2012.¹ Research has determined some of the benefits of patient reporting: identification and investigation of new drug safety signals, more information about the severity and impact of ADRs on quality of life, and enhancing dialogue between patients and

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healthcare professionals (HCPs).^{2,3} Spontaneous reporting systems (SRSs) have many limitations, such as under-reporting, delayed reporting and the difficulty of comparing different systems.⁴ However, reviews of patient reporting in a variety of countries have recognised both the overall scientific value of patient reports and the importance of facilitating these reports.^{2,5}

In the UK, Yellow Card (YC) patient reports of suspected ADRs are submitted to the Medicines and Healthcare products Regulatory Agency (MHRA) through the Yellow Card Scheme (YCS). People who choose to report their ADRs can do so via the internet, telephone or post. Previous research has examined all reports submitted to the YCS between 2005 and 2007.⁶ It found that patient reports could be considered a valuable element of PV with detailed descriptions of ADRs and reports of different drug types and reactions to those submitted by HCPs.⁶ Recommendations were made to increase awareness of the YCS among the public, which resulted in increased advertising by the MHRA, eg, a social media campaign to promote YC reporting in 2017, to increase the usefulness of reports by providing guidance on what to report and inclusion of information on patient reporting in patient information leaflets (PILs).

Recent research into chronic illness has used available narrative resources to explore the personal elements of the illness experience.⁷⁻⁹ A narrative approach can facilitate analysis that highlights the variation and complexity of the illness experience as well as its social and cultural context.⁸ However, little is known about the thematic content of illness narratives of patients with suspected ADRs. There has been increased interest in using data sources such as social media and social media postings as potential new sources for PV data.¹⁰ Previous research has indicated that combining data from several sources can assist the detection of safety signals.¹⁰ Using social media data or existing data sources in innovative ways can augment PV systems, supplementing established methods of data collection such as YC reports.¹¹ Current YC reporting forms include free-text comment boxes, which can be used by reporters to provide information on the following: description of their ADR experience including symptoms, use of medicines, details of outcome and other relevant information. While the free text is used by the MHRA in the assessment of the YC report, contributing to coding of reaction terms, very limited analysis of free-text data from YC reports has been conducted to date.⁶ This study used this novel data source, free-text data within patient YC reports submitted to the MHRA, to investigate patients' experiences of ADRs and their impact on patients.

2 | METHODS

In 2015 there were 5439 YC reports to the YCS composed of 4501 patient reports, 712 from parents and 226 from carers.¹² During a 6-month period from July to December 2015 a total of 3060 YC reports were received by the MHRA. These were 2457 patient reports, 487 from parents and 116 from carers. Vaccination reports ($n = 775$) were excluded from the 6-month data set as these reports could contain vaccine-specific effects such as confounding by indication, increased symptom reports and healthy vaccine biases.¹³ The remaining YC

What is already known about this subject

- Suspected adverse drug reactions (ADRs) can be reported in the UK since 2008 via the Yellow Card scheme.
- Patient reporting of ADRs is an important method of pharmacovigilance helping to strengthen signal detection.
- Patient reports can also provide an additional perspective on the impact of ADRs on daily life.

What this study adds

- Free text data from Yellow card (YC) reports is a novel source offering increased insight into patients' experiences.
- ADRs can have significant impact often with prolonged physical, psychological or social consequences.
- Patients largely used temporality to determine if a link existed between a drug and adverse effects, using differential diagnosis and information sources to a lesser extent.

reports ($n = 2285$) were subjected to quantitative and qualitative analysis.^{14,15} Narrative analysis of the free-text data was conducted on 2255 reports after exclusion of duplicates ($n = 4$) and blank reports ($n = 26$). The data provided in YC reports included details of reporter type in three categories: (1) patient/self-reports from those who experienced ADR (2) reports submitted by carers on behalf of another with an ADR and (3) parent reports submitted on behalf of children with ADRs; reporting method (internet, telephone, paper, YC leaflet); age and gender of person experiencing ADR; suspect drugs; reaction terms; severity of reaction (severity status classified by MHRA using the Medical Dictionary for Regulatory Affairs [MedDRA] dictionary to assess reaction preferred terms) and outcomes (eg, life-threatening, hospitalised, disability/incapacity) as well as all free-text comments.

2.1 | Ethics statement

This study phase received favourable ethical approval from the Independent Scientific Advisory Committee for MHRA database research (ISAC; Ref GENQ-00097958). The Medway School of Pharmacy Research Ethics Committee was informed of the study and ISAC approval was obtained.

2.2 | Data analysis

A qualitative review of the YC narrative reports was conducted using the data management program QSR NVivo 10 to facilitate organisation and analysis of the data. Initially thematic analysis was used to identify recurrent themes across the large dataset. This involves five phases: familiarisation with the dataset; initial coding; identification and organising of themes into hierarchical clusters; reviewing and

finally defining themes to create a comprehensive framework of themes.¹⁶ The initial coding was conducted (B.O'D.) and then discussed by members of the research team (J.K. and R.R.) with differences resolved by consensus. Once coding was finalised and a thematic framework had been created, the remaining free-text data were coded (B.O'D.). Common themes emerged in this inductive process: varied experiences of ADRs, the multidimensional impact of ADRs and coping strategies. Cases with these common thematic elements were selected for narrative analysis to explore the different aspects of ADRs from the patient's point of view (see Figure 1). A narrative inquiry approach was selected as it focused on understanding how people present their personal experiences and offered insight into the variety and complexity of people's experiences of ADRs.^{17,18} Riessman's thematic and structural analyses were used to systematically evaluate the narrative texts, which centre on what was said and how it was said. Narratives were interpreted by examining their content, structure and form, and allowing narrative patterns to be considered in a broad environmental and social context.^{17,18} Close reading of these texts identified key narrative aspects in ADR experiences that focused on how patients decided that they had experienced an ADR, the impact of these reactions on patients' daily lives and the strategies patients used to manage their ADRs. Texts were examined together to identify common patterns or different experiences and to avoid underanalysis.¹⁷ This paper presents a narrative analysis of the free-text data from 2255 YC reports.

3 | RESULTS

3.1 | Characteristics of the YC reports

A total of 2255 reports were analysed: 2096 "patient" reports (92%), 99 (4%) "carer" reports and 90 (4%) "parent" reports. The highest proportion of reports were for females (1522, 67%), for people aged 21–40 years (675, 31%), with severe reactions in 1621 (71%) reports. Most reports were submitted via the internet: 1877 "patient"/reports (90%), 83 "carer" reports (84%) and 81 "parent" reports (90%) (see

Table 1). A list of the reported causative drugs and its rINN are included in the appendices (Appendix 1). Details on the different types of suspect drugs in these reports have been reported elsewhere.¹⁵

Analysis indicated three distinct narrative patterns of the ADR experience: (1) identification of ADRs, (2) severity and impact of ADRs, and (3) management of ADRs.

The results are presented below in Table 2 with both thematic and narrative themes and also includes illustrative quotes by reporter type (patient, carer or parent) and drug type.

3.2 | Identification of ADRs

Information on methods of ADR identification was provided in 679 (30%) reports. These methods included the timing sequence of side effects (SEs) (14%), differential diagnosis (5%), confirmation with HCPs (6%), PILs (2%) and/or other information sources.

While some information on timing of the SEs is available elsewhere in YC reports, the free-text data describes the use of temporal associations to identify the ADR, including de-challenge, re-challenge and changes in dose:

"Within an hour of taking the medication I have extremely uncomfortably sweating which lasts for about 4 hours which I never had in the past. I have tried varying the times I take it to no available [sic]. I have even tried not taking it for one day and found that I did not get the sweating. And as soon as I started it again the next day the sweating came back." Patient, female, 63 years, propranolol, I-Net.

Some patients made a differential diagnosis by assessing the factors that could be causing their ADR:

"...hives/rash on palm of left hand, wrist and between fingers. No exposure to anything new which might cause this." Patient, male, 27 years, citalopram, I-Net.

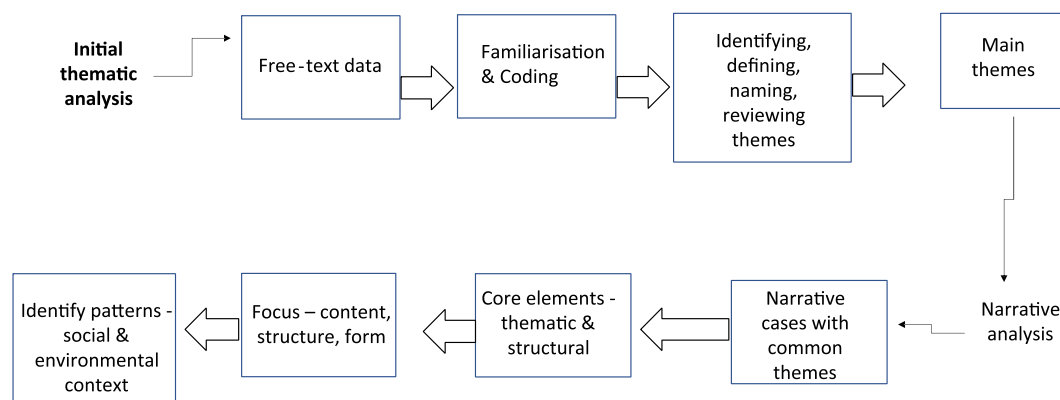


FIGURE 1 Coding processes: thematic and narrative analysis

TABLE 1 Report characteristics by reporter type (n = 2285)

Reported characteristics	Reporter type F (%)		
	Patient	Carer	Parent
<i>Age categories (years)</i>			
Infants <1	0	0	27 (100)
1–20	92 (62.6)	2 (1.4)	53 (36.1)
21–40	649 (96.1)	19 (2.8)	7 (1.0)
41–50	330 (97.9)	5 (1.5)	2 (0.6)
51–60	355 (97.5)	9 (2.5)	0
61–70	50 (95.1)	18 (4.9)	0
71–80	162 (90.5)	17 (9.5)	0
Over 80	44 (71.0)	18 (29.0)	0
<i>Gender</i>			
Male	656 (31.4)	48 (50.0)	48 (53.9)
Female	1433 (68.6)	48 (50.0)	41 (46.1)
<i>Method of reporting</i>			
Internet (I-net)	1877 (89.6)	83 (83.8)	81 (90)
Telephone	70 (3.3)	7 (7.1)	3 (3.3)
Paper	131 (6.3)	8 (8.1)	6 (6.7)
Yellow Card leaflet	13 (0.6)	0	0
<i>Seriousness of side effects</i>			
Coded as “serious” by MHRA ^a	1481 (70.7)	72 (72.7)	68 (75.6)
Coded as “non-serious” by MHRA ^a	615 (29.3)	27 (27.3)	22 (24.4)

^aMHRA in-house classification of severity status: assessment of reaction preferred terms within the Medical Dictionary for Regulatory Affairs (MedDRA) dictionary.

ADRs were also confirmed with HCPs, and pharmacists were often used as an initial point of contact:

“Within hours of applying the gel, the skin on my scalp blistered and subsequently developed crusts. After seeing the pharmacist I made an appointment to see my GP the following day who prescribed an antibiotic cream and confirmed that I should not reapply the gel.”
Patient, male, 78 years, Picato, I-Net.

Only a small number of patients used PILs as a method of identifying their ADR:

“Although I am somewhat prone to mouth ulcers, this is usually after a specific event such as abrasion. After the third ulcer without obvious cause, I checked the patient information leaflet (PIL) for naproxen, which I had been taking for about a week, and noted it was a possible side effect.”
Patient, male, 64 years, naproxen, I-Net.

Many reporters used multiple information sources – the internet, HCPs, family/friends – to assist them in identifying their ADRs:

“Dizziness, drowsiness, hallucinations, headache, rapid heart rate, shaking, sleep disturbance, vertigo, vomiting. After speaking to a nurse and basic searches on the internet, the patient was told they should never have been given such a high dose.” Carer, female, 49 years, Zamadol SR, I-Net.

3.3 | Severity and impact of ADRs

Elaborate narratives were provided on ADR severity with a range of mild, moderate and severe effects. Information on the severity of ADR effects was explicitly provided in 1371 reports (44%), mild effects were described by 290 (21%), moderate by 532 (39%) and severe by 559 (41%). Some reports described effects as “severe” which would be commonly labelled by HCPs as “mild”, eg. rash, muscle pain, diarrhoea:

“Side effects – just like a bad flare up of irritable bowel disease/irritable bowel syndrome – stomach pain/cramps and severe diarrhoea. One day I was in tears at work after being stuck in the restrooms for nearly 2 hours.”
Patient, female, 30 years, Xeristar, I-Net.

TABLE 2 Thematic and narrative analysis: subthemes, themes and illustrative quotes

Sub-themes ^a	Thematic themes ^b	Narrative themes ^c	Illustrative quotes ^d
Timing sequence	Reconstruction of ADRs: describing and evaluating the experience	Identification of ADRs	"Nausea from start of treatment, second day I struggled to drink anything. Third day, unable to eat or drink and started having visual hallucinations"
Differential diagnosis			Patient, female, 20 years, clarithromycin, I-net
HCP confirmed			"Bleeding, bad migraines, memory loss, insomnia, loss of appetite and premenstrual syndrome symptoms. The effects of these tablets were readily increasing every day I took one."
GPs/hospital doctors, pharmacists			Patient, female, 46 years, Cerazette, I-net
Pharmacist often initial contact			"Heartburn particularly bad at night. Severe enough to interrupt sleep. Only started after a couple of days of taking the medicine. I do not normally get heartburn."
Confirmed with patient information leaflets			Patient, female, 38 years, flucloxacillin, I-net
Confirmed with family/friends	Reconstruction of ADRs: describing and evaluating the experience	Identification of ADRs	"...hives/rash on palm of left hand, wrist and between fingers. No exposure to anything new which might cause this."
Confirmed on internet			Patient, male, 27 years, citalopram, I-net
			"Change to sense smell. The smell was so profound I felt sick with it. Eventually it dissipated but later it returned but not so bad. Spoke to GP who advised to not take any more."
			Patient, female, 59 years, doxycycline, I-net
			"Increased hair loss, easy bruising and muscle twitches... Mentioned to general practitioner and to pharmacist. Pharmacist suggested I report side effects here."
			Patient, female, 53 years, venlafaxine, I-net
	Reconstruction of ADRs: describing and evaluating the experience	Identification of ADRs	"I suffered severe irrational thoughts as well as anxiety, could not eat very much...I went on internet to see side effects and could not believe the amount of people who felt exactly how I did."
			Patient, female, 53 years, Nasonex, I-net
			"Diarrhoea got progressively worse as the weeks went on ... I was unsure if it was related to my sensitive stomach...I was advised to stop the cough syrup by a friend who is a physiotherapist who knows my medical history and suspected I was having a reaction."
			Patient, female, 34 years, Robitussin chesty cough, I-net
			"Very severe aplastic anaemia. Had eye drops prescribed by general practitioner and used them for 2 days only... The leaflet enclosed in drops stated in rare cases can cause aplastic anaemia. It states on some research on the internet that it should not be used in children under 2 years of age."
			Parent, male 1 year, chloramphenicol, I-net

TABLE 2 (Continued)

Sub-themes ^a	Thematic themes ^b	Narrative themes ^c	Illustrative quotes ^d
Detailed descriptions of mild, moderate and severe effects	Multidimensional impact of ADRs	Severity and impact of ADRs	<p>"I was having the same reaction as my nutmeg allergy which alerted me – mild anaphylactic reaction (itching, disorientation and red splotches on skin)."</p> <p>Patient, female, 35 years, amoxicillin, l-net</p> <p>"Hands became swollen first and feet shortly after. Swollen hands and feet causing severe pain when walking, and pain when using hands for anything. Doctor prescribed strong pain killers and ibuprofen gel."</p> <p>Patient, male, 67 years, Januvia, l-net</p> <p>"Severe myalgia and exhaustion. Began with severe muscle pain in right calf. Gradually spread, getting worse each day, to most muscles all over body to the point that I could hardly walk and trying to lift a knife and fork to eat was an ordeal. Extreme depression caused either by medication or difficulty with daily life."</p> <p>Patient, female, 59 years, Januvia, l-net</p> <p>"Been taking citalopram for 7 years. Had similar reaction about a year ago...With this batch experienced increased anxiety and poor sleep."</p> <p>Patient, male, 46 years, citalopram, l-net</p> <p>"Insomnia, anxiety, feeling "fuzzy headed": Paranoia about harming my family whilst suffering from insomnia. My head was racing, similar to if I'd drunk a lot of caffeine or was suffering from stress. I could not stop being scared that I might turn psychotic and kill my family. It scared the hell out of me!"</p> <p>Patient, female, 37 years, Selincro, l-net</p> <p>"It started when I was in a meeting at work – I started to get tunnel vision and eventually lost consciousness for a split second then I found it very difficult to concentrate and I felt panicky. This has got worse and worse despite my discontinuation of the drug. I constantly have blurred vision, I feel panicky and agitated in social situations (I have never suffered with panic or anxiety before), I get dizzy, I find it incredibly hard to focus and think analytically, as a result I'm developing stress and worry as it is affecting my work. I feel constantly spaced out and slightly removed from myself."</p> <p>Patient, male, 26 years, omeprazole, l-net</p> <p>"Severe muscular weakness and pain in both arms. Feels like burning and muscular spasms...Affecting my everyday life – hard to do housework, pick things up."</p>
"Severe" used by reporters			
"Mild" symptoms, eg, muscle pain but reported as "severe"			
Self-assessment not linked to HCP consultation or outcomes			
Explicit physical, psychological and social effects	Anxiety, depression, irrational thoughts		
Anxiety, depression, irrational thoughts			
Significant impact on quality of life			
Negative effects on work and family life			

(Continues)

TABLE 2 (Continued)

Sub-themes ^a	Thematic themes ^b	Narrative themes ^c	Illustrative quotes ^d
HCP consultation	Coping with ADRs	Management of ADRs	Lack of sleep due to pain in arms. Pain is still there whilst resting."
Some multiple interactions			Patient, female, 60 years, amitriptyline, diclofenac sodium, Lyrica, I-net
Prescribed medicine to counteract effects			"Ruptured post tibial tendon. Joint and tendon, muscle pain. Anxiety. Fatigue. Pins and needles...from a fit and active person to disabled in three days. I rode horses and was able to do all the associated work. I am only just able to walk without crutches for short distances and still need them for rough ground. My husband had to take over the running of the house, the horses and dogs and caring for elderly relatives. This had had a catastrophic effect on our lives as a family."
Negative interactions			Patient, female, 62 years, ciprofloxacin, I-net
Self-directed behaviours			"Issued by the diabetic doctor at the hospital. Went to chemist for guidance and cream. Was advised by pharmacist to stop taking Invokana and report to my doctor. I was away from home at the time but went to the doctor this morning."
Stopping meds/remove device			Patient, male, 71 years, Invokana, I-net
Reducing dose			"Severe full body skin rash. Began with hives that merged. Arms, hands, legs and feet swollen. Large blisters on tops of feet. Skin turned purple and black... Spoke to radiology department to identify what I was given and to inform them of my condition. Spoke to general practitioner (GP) to have Omnipaque added to my list of allergies and to seek advice about blisters"
Over-the-counter remedies to counteract symptoms			Patient, male, 49 years, omnipaque, I-net
Self-directed nonmedicine management			"Flickering at the side of my eye briefly. Then 2 weeks later rippling vision over half of my field of vision lasting about 15 minutes. I stopped taking the amlodipine in case they were causing the problem."
Complimentary alternative medicines to treat side effects			Patient, female, 67 years, amlodipine, paper
Coping strategies			"Abdominal bloating, pelvic pain. Pelvis felt like it was on fire. it felt like I had a terrible infection, paracetamol did not work, had to stay in bed all day. This was very upsetting, so I also felt emotionally low...Lots of little blister like spots. Then several painful large ones appeared...I should also have mentioned that I found the side effects so unbearable that I took the Mirena out myself."
Accepted effects			Patient, female, 43 years, Mirena, I-net
Recorded suspect ADR			

TABLE 2 (Continued)

Sub-themes ^a	Thematic themes ^b	Narrative themes ^c	Illustrative quotes ^d
			<p>"Since stopping the medication I'm always constipated, had recurring vaginal yeast infections, need to buy and take high doses of probiotics always now."</p> <p>Patient, female, 22 years, doxycycline, I-net</p> <p>"Dry mouth, especially during exercise. Indigestion – taking omeprazole to counter. Two instances of cystitis requiring antibiotics. The difference the medication has made to my quality of life is such that I am prepared to put up with the side effects."</p> <p>Patient, female, 57 years, Betmiga, I-net</p>

Abbreviations: ADR, adverse drug reactions; HCP, healthcare professional.

^aSubthemes: elements of text which are generated during coding and contribute to an overall pattern/theme.

^bThematic themes: central patterns that emerge in thematic analysis to form a thematic framework.

^cNarrative themes: key aspects of narrative cases that emerge during analysis.

^dQuotes selected to highlight themes/patterns in data.

Self-assessment of ADRs was not linked to HCP consultation or negative outcomes. Many effects which did not result in hospitalisation or incapacity were still described by reporters as "severe".

A considerable proportion of YC reports described the impact of ADRs. Overall, the impact of adverse effects was described in 2140 reports (70%). The majority of reports described explicit physical impacts (2099, 93%) but reports also provided information on psychological (532, 24%) and social impacts (760, 34%). Patients provided vivid accounts of increased anxiety, depression and/or irrational thoughts which caused serious disruption to their everyday lives:

"Tiredness, rash and itchiness. I would like to stop taking these tablets. I feel bad taking them, headaches, severe aches in my legs and very sore hips, swollen fingers and the feeling of being constantly depressed."

Patient, male, 58 years, Ramipril, I-Net.

In many cases these debilitating impacts could persist over time and overlap across physical, psychological and social domains. Many carers reported a combination of negative effects across these domains:

"Her body began to inflate like a balloon. Her body became numb...Such changes in her body and face made her very distressed. She could not bear her physical changes and numbness. She became disabled from her distress and lost her independence." Carer, female, age not supplied, Seroxat, paper.

The convergence of these effects often had adverse implications for patients in their emotional and social functioning. It was clear that numerous aspects of patients' lives were negatively affected, including their social/work life, with attendant impact on their quality of life:

"Couldn't run, sleeping 18 hours, change of personality, no motivation to do anything, apathy, loss of friends. Loss of jobs. The antipsychotics have nearly completely destroyed my life. I am no longer able to function like I once did. My mind is now in a total mess."

Patient, male, 20 years, Risperdal Consta, I-Net.

Many of the narratives also focused on the negative effects of ADRs on family life. Patients' distress was often further compounded by strained relationships and disruptions to established roles within familial structures. These particular concerns were consistently highlighted with evocative descriptions of the negative effects on the family environment:

"My father was on this medication for 6 months before his death and day to day life for himself and his wife and my sisters was awful. He became aggressive,

violent and suffered severe anxiety and paranoid thought. He mentioned suicide on more than one occasion." Carer, male, 50 years, Champix, I-Net

3.4 | Management of ADRs

Overall, 990 (41%) reports provided details of how patients managed their ADRs, including HCP consultation, self-directed interventions (medical/nonmedical), accepting the effects and taking steps to prevent a further event. Generally, reports linked to older age categories were more likely to report a consultation with HCPs. Some patients were prescribed medicines to counteract their symptoms:

"Nausea, severe migraine, pain in legs and pelvic area, anxiety, persistent vomiting unable to stop for 3 days... a practice nurse made a home visit and prescribed prochlorperazine 3 mg to stop the vomiting and paracetamol suppositories for the pain." Patient, female, 48 years, Esmya, I-Net.

Patients consulted with a range of HCPs, including general practitioners (GPs), pharmacists, hospital doctors, nurses etc. GPs were the first point of contact for most patients and many had multiple HCP contacts:

"I was prescribed the clarithromycin and metronidazole to be taken together by the A and E doctor ... Later, I woke up with a very sore mouth and throat. I contacted my general practitioner (GP) to see if I should stop taking them. I saw the GP in the evening taking the medication with me, by this time my mouth lips and throat were blistered."
Patient, female, 71 years, I-Net.

However, some patients described negative experiences with HCPs, with the perception their symptoms dismissed as minor/insignificant:

"Reduced sexual drive. Inability to maintain erection. I spoke to a General Practitioner (GP) at my local practice. She said that as I was in my fifties it was probably not something to worry about – whilst inconvenient, she said, it was better than being depressed." Patient, male, 50 years, fluoxetine, I-Net.

Many patients decided not to adhere to the medicine themselves once the symptoms presented:

"The consequences of stopping the statin were immediately noticeable. I lost most of my aches and pains that I suffer overnight and the pain in my elbows cleared up ... I have stayed off atorvastatin for

5 weeks...and I have no more aches or pains." Patient, male, 60 years, atorvastatin, I-Net.

These self-directed behaviours also included reducing the dose or using over-the-counter remedies to treat the effects. Patients also lessened the effects with simple nonmedical methods, eg, drinking milk to counteract heartburn or complimentary alternative medicines. While patients described a variety of methods of managing ADRs, some considered that the benefits of their medicines outweighed their side effects:

"The mouth ulcers occur every time I have the injection about one to three weeks after. Sometimes they last for a few days but they have lasted for three weeks. Each time I take the medicine which I've been on for two years I get one of the side effects. The mouth ulcers have been seen by my dermatologist but I had plaque psoriasis covering 85% of my body including my hair and face so I am more than happy to suffer with the occasional side effect." Patient, female, 36 years, Stelara, I-Net

Some patients explicitly stated their intention to take preventative steps by recording the ADR in their medical records:

"I have also written to my doctor to add to my notes that I need to have the Jenson Product to keep my blood pressure and pain at bay."
Patient, female, 67 years, omeprazole, I-Net.

Some information on the motivation for reporting ADRs was evident: YC reporters wished to share their experiences, increase patient awareness of debilitating effects and prevent others from suffering similar reactions:

"Needless to say I am stopping taking the Nefopam immediately as its hard enough coping with the problems I have without these extra problems. I hope my experience may help others not go through the same."
Patient, female, age not supplied, nefopam hydrochloride, paper.

4 | DISCUSSION

This research used an existing resource – free-text data from YC reports – to increase insight into patients' experiences of ADRs. The qualitative analysis of free-text comments in a large UK-wide sample resulted in three key narrative themes: (1) identification of ADRs, (2) severity and impact of ADRs, and (3) management of ADRs.

Analysis of YC data indicated that patients mostly use temporal associations to link symptoms to medication, which reflects previous research.^{19,20} Other methods of identification were differential

diagnosis and a variety of information sources to confirm ADRs. While HCPs and PILs were the most commonly cited sources, the overall use of HCPs, PILs and the internet was low. This may be a simple result of under-reporting: HCPs/PILs might have been used but as YC reports do not seek information on how people identified their ADR their use may not have been explicitly reported. It is noteworthy that many YC reporters used multiple sources, which can increase the possibility of contradictory information as well as information overload.²¹ Effective patient-centred health information about ADRs should consider the implications of multiple information sources and factors such as information overload. Our study used patient reports, which ensures the patient has already made a causal link. It is important to note that some patients do not make such casual links and may have a different experience.²²

Detailed information on the severity and impact of ADRs was supplied by reporters. These findings further illustrate the serious disruption to many patients' lives which can be a feature of ADRs.²³ A striking finding was the prolonged impact of such effects for many YC patients: persistent negative physical, psychological and social consequences. Similar patterns of impaired emotional and social functioning were found in previous YC research,⁶ internet forums and qualitative research with survivors of serious ADRs.^{24,25} The addition of a section to YC reports on the impact/disruption to daily life of ADRs could increase their usefulness and provide information on persistent negative physical, psychological and social consequences of ADRs. Another important finding concerned the self-assessment of ADRs by patients. Many described effects as "severe" which included effects commonly labelled by HCPs as mild, such as rash and muscle pain. Individual perceptions and attentional biases in health behaviours may explain elevated perceptions of severity.^{26,27} However, rather than dismissing these patients' assessments as heightened health anxieties or symptom amplification, they should be taken as evidence of divergent opinions on symptom severity between patients and HCPs. Regardless of HCP perception, if a patient perceives an ADR as severe they may stop taking the medicine. Awareness of the differences that can exist between patients' perceptions of symptom severity and those of HCPs could inform effective HCP-patient risk communication and shared decision-making about medicines.

Many reports provided details of how patients managed their ADRs, including HCP consultation, nonadherence and counteracting effects with additional medicines. Previous research with patients with a chronic condition has identified higher use of HCP consultation and use of additional medicines to alleviate the effects, along with lower nonadherence.²⁸ Specific health concerns in patients with chronic conditions might mean they use different managing behaviours than YC reporters. Many YC reporters who described HCP consultations also stopped their medicine, contrasting with previous nonadherence studies where patients who sought information from non-HCPs were more likely to be nonadherent.^{29,30} Higher levels for nonadherence were evident among YC reporters than was found in a UK-wide Omnibus survey conducted in 2009.³¹

It is noteworthy that many reports described interactions across a range of HCPs, GPs, pharmacists, hospital doctors, nurses etc., and

that engaging with HCPs is a key aspect of managing ADRs. However, as with previous YC research, dismissive attitudes to ADRs amongst HCPs were evident in the free-text comments of our study.⁶ The importance of listening to the patient's experience of ADRs should be emphasised in HCP education.

As with previous YC research⁶ many YC reporters were motivated to share their experiences for altruistic reasons such as preventing harm to others and improving patient safety. However, only a small number of YC reports described an intention to record ADRs in medical records. An accurate medical record, including ADRs, is important to the risk assessment of future prescribing decisions. While time constraints, accessibility to HCPs and attitudes of HCPs may prevent this recording, spontaneous reporting systems should emphasise the benefits of informing HCPs of suspected ADRs. Future research should address patients' specific concerns about interactions with HCPs about ADRs.

A recent analysis of patient reports in the Netherlands has concluded that methods need to be optimised to maximise the use of patient-reported information, including closer working with patient organisations and the development of new systems for analysing the data.³² Research which focuses on developing appropriate text-mining and natural language processing (NLP) techniques could assist with analysis of free-text comments and enhance patient reporting.

5 | STRENGTHS AND LIMITATIONS

A major strength of the study was the novel use of an underused resource, the free-text data from YC reports. This approach resulted in increased insight into patient experience of ADRs: how patients perceive and manage their ADRs. The most significant limitation was the problem of self-selecting bias. Reporters to the YCS were motivated to report their ADRs and this high level of engagement may offer a limited/skewed perspective which does not represent the opinions and experiences of the wider general population. However, the reports were UK-wide and diverse in reporter type, gender, age and drug type, which may have corrected the self-selection distortions. Researcher bias may also have been an additional limitation, but attempts were made to minimise this by documentation of the analytical processes and collaboration with supervisors.

6 | CONCLUSIONS

Free-text comments on spontaneous reports of ADRs from patients have value and the potential to contribute toward knowledge of patients' experiences. The findings reported here reflect the range and multidimensional impact of ADRs. Future research directions could involve the linking of narrative profiles to specific drug types or reactions, using YC reports to improve communication training for HCPs to facilitate effective communication about potential ADRs and record keeping of suspected ADRs and dissemination of information about the impact of ADRs to patients and HCPs. This could involve

the expansion of the text in PILs to include examples of the potential impact of ADRs and the addition of summarised experiences of these impacts, identified from free text, to patient websites by patient organisations.

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COMPETING INTERESTS

The authors declare that they have no conflict of interest.

CONTRIBUTORS

All authors contributed to the study conception and design. Material preparation and data analysis were performed by B.O'D., J.K. and R.R. The first draft of the manuscript was written by B.O'D. and all authors contributed to the final manuscript. All authors read and approved the final manuscript.

CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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APPENDIX A

Causative drug as reported in Yellow Card reports	International Non proprietary Name (rINN)
Propranolol	Propranolol
Sertraline	Sertraline
Picato	Picato
Naproxen	Naproxen
Zamadol SR	Zamadol SR
Xeristar	Duloxetine
Ramipril	Ramipril
Seroxat	Paroxetine
Risperdal Consta	Risperdal
Champix	Varenicline
Esmya	Ulipristal
Fluoxetine	Fluoxetine
Atorvastatin	Atorvastatin
Stelara	Ustekinumab
Omeprazole	Omeprazole
Nefopam hydrochloride	Nefopam
Clarithromycin	Clarithromycin
Cerazette	Cerazette
Citalopram	Citalopram
Flucloxacillin	Flucloxacillin

Causative drug as reported in Yellow Card reports	International Non proprietary Name (rINN)
Doxycycline	Doxycycline
Venlafaxine	Venlafaxine
Nasonex	Nasonex
Robitussin chesty cough	Robitussin chesty cough
Chloramphenicol	Chloramphenicol
Amoxycillin	Amoxycillin
Januvia	Sitagliptin
Citalopram	Citalopram
Selincro	Nalmefene
Amitriptyline	Amitriptyline
Lyrica	Pregabalin
Diclofenac sodium	Diclofenac sodium
Ciprofloxacin	Ciprofloxacin
Amlodipine	Amlodipine
Mirena	Mirena IUD
Doxycycline	Doxycycline
Betmiga	Mirabegron