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REVIEW ARTICLE

ADR Reporting by the General Public: Lessons Learnt from the Dutch and Swedish Systems

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Abstract Consumer reporting of adverse drug reactions (ADRs) has existed in several countries for decades, but throughout Europe the role of consumers as a source of information on ADRs has not been fully accepted until recently. In Europe, The Netherlands and Sweden were among the first countries to implement consumer reporting well before it was mandated by law throughout the EU. Consumer reporting is an integral part of the spontaneous reporting systems in both The Netherlands and Sweden, with yearly numbers of reports constantly increasing. Consumer reporting forms and handling procedures are essentially the same as for healthcare professional reporting; the message in the reports, not the type of messenger, is what is of importance. Studies have established the significant contribution of consumer reporting to ADR signal detection. Combining all reports regardless of reporter type is recommended since it yields the largest critical mass of reports for signal detection. Examples of signals where consumer reports have been of crucial importance for signal detection are electric shock-like sensations associated with the use of duloxetine, and persistent sexual dysfunction after discontinuation of selective serotonin reuptake inhibitors. An example of consumer reporting significantly strengthening a detected signal is Pandemrix® (influenza H1N1 vaccine)-induced narcolepsy. Raising public awareness of ADR reporting is important, but time- and resource-consuming. The minimum effort taken should be to passively inform consumers, e.g. via stakeholders' homepages and via drug product information leaflets. Another possibility of reaching out to this target group could be through co-operation with other (non-government) organizations. Information from consumer reports may give a new perspective on ADRs via the consumers' unfiltered experiences. Consumers' views may change the way the benefit–harm balance of drugs is perceived and assessed today, and, being the ultimate users of drugs, consumers could have a relevant influence in the regulatory decision-making processes for drugs. All stakeholders in pharmacovigilance should embrace this new valuable source of information.

Key Points

Consumer reporting increases the number of adverse drug reactions (ADRs) reported to a pharmacovigilance centre and contributes to signal detection.

Consumer reports provide a new perspective of the experiences of ADRs of drugs in a way not otherwise available.

With the development of consumer reporting systems and new ways to obtain consumers' experiences through the Internet and social media, consumers have the potential to play a major role in tomorrow's pharmacovigilance.

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1 Introduction

1.1 Spontaneous Reporting Systems

Spontaneous reporting systems have been the backbone of pharmacovigilance since their introduction in the 1960s. The main aim of spontaneous reporting is the early detection of previously unrecognized adverse drug reactions (ADRs). In addition, spontaneous reporting can also be useful for obtaining information on new aspects of known associations between drugs and ADRs [1]. Spontaneous reporting has methodological shortcomings but currently remains the most valuable method for early detection of ADRs [2, 3]. Initially, reporting of ADRs was, in most countries, reserved for healthcare professionals (HCPs). In 2007, the Erice Manifesto specified challenges to be addressed to ensure the continuing development of the science of pharmacovigilance. A key issue mentioned in the manifesto was the active involvement of the public in decisions regarding their own health and the treatment of diseases, including discussions about benefits and risks of medicines [4]. This was one of the stepping stones for the inclusion of consumers as reporters of ADRs throughout the world.

1.1.1 Terminology

For the sake of clarity, in this article the term 'consumer reporting' has been chosen to refer to ADR reports from the general public. Others use the term 'patient reporting', but the broader term 'consumer reporting' is more relevant as not all consumers are patients, while the information they can provide may be equally important. For example, the patient who is prescribed an analgesic by his or her physician, and the individual who buys painkillers at the pharmacy without consulting an HCP are both consumers of the medicinal product [5].

A consumer report is a report of a suspected adverse reaction of a medicinal product. It is initiated by the consumer and usually without interpretation by an HCP. In some countries, the reporting will be undertaken directly by the consumers themselves or by a person close to the consumer (e.g. a relative), while in other countries reporting can also be performed/aided via a nurse or pharmacist. In this case, a report is considered to be a consumer report if the HCP assists the consumer only in the submission of the report and does neither initiate the report nor provide additional information or interpretation to it. If an HCP reports a personal experience of an adverse reaction to a medicine, this can be regarded either as a consumer report or as an HCP report, depending on national interpretation [5].

1.1.2 The Value of Consumer Reporting

Although consumer reporting of ADRs has existed for decades in some countries, e.g. the US, Canada and New Zealand [6], the role of consumers as a source of information on ADRs has only recently been acknowledged in Europe. A key issue for the failure of consumer reporting previously gaining a wider acceptance within the field of pharmacovigilance was the lack of (published) practical experiences and evidence of its value [7]. In Europe, The Netherlands and Denmark opened their respective national spontaneous reporting systems to the general public in 2003, followed by the UK in 2005 and Sweden in 2008. Since then, more data on the value of the contribution of consumer reporting to pharmacovigilance has become available [8–17]. The state of national systems for consumer reporting was investigated in 2010 through interviews with staff in 15 national competent drug authorities and/or other relevant organizations focusing on their experiences and attitudes [18]. The revised EU pharmacovigilance legislation (for human use) in 2012 required all EU member states and Marketing Authorisation Holders (MAHs) to introduce consumer reporting systems. Consequently, more countries in Europe and elsewhere have invited consumers as reporters of ADRs [19].

Underreporting of ADRs by HCPs [19] is an acknowledged characteristic of spontaneous reporting [19, 20], and targeting consumers as reporters was initially described as a means to increase the number of reports in order to enable earlier detection of ADRs [21]. Indeed, the proportion of consumer reports out of all ADR reports in, for example, the US, UK, The Netherlands [6] and Sweden [22] is substantial. However, the contribution of consumer reporting to pharmacovigilance goes beyond a quantitative contribution. Consumer reporting has brought a new dimension to pharmacovigilance. Consumers provide first-hand information about the ADRs and, with the lack of a professional filter, their reports may lead to a better understanding of the consumers' real-life experiences of the ADR [23–25]. In the UK, consumer reports on paroxetine were better at explaining the nature, personal significance and consequences of the ADRs than HCP reports on similar associations [25]. In addition, in the UK it was found that consumer reports gave more detailed information regarding the effects of the ADR on the quality of everyday life [26]. Information from consumers may challenge the concept of what is considered a 'tolerable' side effect of a drug [27]. This was illustrated in an article with consumers' comments on the impact of ADRs related to statin use, e.g. "To keep my weight under control I used to visit gym classes for senior citizens, did fitness training and walked for many kilometers. During the use of simvastatin, I became more and more immobilized and could not leave the house. The

quality of my life was reduced severely. Now I'm walking again and feel a lot happier" [23].

The severity of the ADR is a main motivation for consumers to report [25, 29]. As with the concept of 'tolerability' of side effects, it is important to be aware that the concept of the 'seriousness' of a side effect in the medical community may differ significantly from the views of consumers [30]. Many ADRs that are regarded as non-serious according to internationally agreed professional criteria may be considered serious or intolerable problems for patients, e.g. sexual side effects [30, 31]. Dutch consumers reported 'decreased libido' more often than HCP reporters. This may reflect that either consumers and HCPs are reluctant to discuss sexual side effects and/or that side effects of this type are of greater importance to consumers than HCPs perceive them to be [31].

Consumers report different ADRs than HCPs. Being unconstrained as regards probability and plausibility of causality between a drug and a perceived ADR, consumers may report relevant events that HCPs may consider to be unlikely related at first. An example from The Netherlands was the signal of pathological gambling addiction associated with the use of the dopamine agonist pergolide for the treatment of Parkinson's disease, which was initially based on two reports—one from a consumer and one from a specialist doctor [32]. In some of the reports that followed, mostly from consumers, it became clear that the gambling addiction due to dopamine agonist treatment was sometimes only recognized in a late stage, with great financial and emotional consequences for the patient.

Studies from Denmark and the UK have found differences in the reporting patterns between consumers and HCPs [10, 30, 32, 33]. In The Netherlands, there is some similarity between consumer and HCP reports concerning organ systems and Anatomical Therapeutic Chemical (ATC) classes of reported drugs [30]. A study from The Netherlands concluded that the difference in reported information between ADR reports of consumers and HCPs is that consumer reports are more focused on the personal impact of the reported ADRs, whereas reports from HCPs provide more clinically related information. Hence, reports of consumers and HCPs complement each other in painting a more comprehensive picture of ADRs [35]. Other contributions of consumer reporting have been described in countries where the number of consumer reports is still limited, e.g. identifying signals of counterfeit products and reporting on herbal medicines [6, 36].

1.2 The Monitoring Medicines Project on Consumer Reporting

The need for further development of consumer reporting management in pharmacovigilance was recognized by the Monitoring Medicines consortium [37]. One of the predefined tasks of the project was to review existing patient reporting schemes and to determine necessary components of successful consumer reporting systems. A detailed review of the organization of consumer reporting systems in 11 different countries was also performed. Key issues were addressed with the aim of increasing the impact of consumer reporting on pharmacovigilance. The first issue was raising awareness. In order for patient reporting to have an impact on pharmacovigilance, it is essential that the general public is aware of the possibility of reporting. Second was the need for user-friendly, easily accessible reporting forms, while a third issue for pharmacovigilance centers was the initial adjusting and streamlining of existing internal working processes in order to be able to include consumer reports [6].

In parallel, as part of the Monitoring Medicines project, two additional consumer reporting-related tasks were conceived. First was the WHO handbook 'Safety Monitoring of Medicinal Products: Reporting System for the General Public' [5]. This handbook provides guidance on all aspects of interest when setting up, running, improving and strengthening a national reporting system for the general public. It further includes guidance on creating reporting forms and the special training needs for pharmacovigilance staff handling consumer reports and the involvement of stakeholders [37]. Second was the development of an online consumer reporting tool for entry of consumer reports to Vigibase, the WHO global individual case safety report (ICSR) database, maintained by the Uppsala Monitoring Centre (UMC; WHO Collaborating Centre for International Drug Monitoring), as described elsewhere in this issue of *Drug Safety*. In addition, a seminar was organized at the World Health Assembly in 2012 entitled 'Empowering patients in pharmacovigilance', and an international joint UMC/WHO/National Competent Authority (NCA) consumer organization workshop/seminar on sharing experiences of consumer reporting was held at the Netherlands Pharmacovigilance Centre Lareb in's-Hertogenbosch in 2012.

By being active members of the Monitoring Medicines consortium and learning more about consumer reporting systems in other parts of the world, the authors have been invited to share and to reflect upon their own consumer reporting systems as well as the role of consumers in pharmacovigilance. The aim of this article is to share experiences concerning facets of consumer reporting from two countries—Sweden and The Netherlands—which have been accepting consumer reports for several years. In addition, future developments in the field of consumer reporting and the use of patient-reported outcomes (PROs) in pharmacovigilance are discussed.

1.3 Changing EU Legislation: Empowerment of the Consumer

During the course of the Monitoring Medicines project, the new European pharmacovigilance legislation was adopted (Regulation [EC] No 726/2004) which made the implementation of consumer ADR reporting systems mandatory for EU member states and MAHs. This demonstrated the acceptance among EU legislators of the need to include consumer reporting in pharmacovigilance. It further emphasized the need for the development of efficient consumer reporting systems contributing to signal detection. In addition, the legislation identified consumers as stakeholders in pharmacovigilance, and that effective methods of communication with the general public should be further developed.

A recent overview of consumer reporting in 50 countries recognized that 17 EU countries had implemented their consumer reporting systems in 2012–2013, as a response to the EU legislative changes [15]. It is also notes that countries that more recently started accepting consumers as reporters have lower reporting rates by consumers than countries who have accepted consumer reports for a longer period of time. Public understanding of medicine safety, of how safety is monitored, and of how to report suspected ADRs is generally limited despite ADRs being commonly experienced [39]. Next to creating awareness about the reporting system, the need to empower lay people to submit reports and the need to reassure them about the value of their reports have been identified as important issues in raising consumer participation [40].

2 Consumer Reporting in The Netherlands and Sweden

2.1 History of Consumer Reporting

In The Netherlands, a consumer reporting system has been in place since 2003 when Lareb started a 1-year pilot study [41]. In the first year, 276 reports were submitted by consumers and 3,131 by doctors and pharmacists. The reports from consumers usually contained sufficient medical information for assessment [41]. Based on the positive results during the pilot, Lareb decided to embrace consumer reporting as a new development in pharmacovigilance. Consumers soon became the fastest growing group of reporters to the spontaneous reporting system. Since 2010, it has also been the largest group of reporters (see Fig. 1a).

At the Medical Products Agency (MPA, i.e. Läkemedelsverket) in Sweden, ADR reporting for drug prescribers has existed for four decades, when positive consumer reporting experiences from neighbouring countries, e.g. Denmark and The Netherlands, led to an investigation into the possibility of expanding the reporter groups to include consumers. In 2005, the MPA started a pilot study in Uppsala County, engaging local pharmacies in promoting consumer reporting. The first few hundred consumer reports most commonly concerned drugs from the ATC classes C (cardiovascular) and N (nervous system), constituting 30 % of the reports, and mainly represented by β-blockers, lipid lowering agents and antidepressants. Ten percent of the consumer reports were classified as serious. Among reports not simultaneously being submitted by the HCPs, 40 % were classified as serious. A few reports led to further investigations, with labelling changes later ensuing. The (unpublished) study on the first 200 consumer reports firmly established their adequate quality and content to complement the already existing HCP reporting system. A decision to implement consumer ADR reporting nationally in Sweden was formally taken by the MPA. The consumer reporting system developed slowly and remained separate from the established HCP reporting system which, for technical reasons, could not receive and house the consumer reports. In 2009, consumer reporting awareness was boosted by the national pandemic vaccination campaign (see Fig. 1b), which gave the programme media attention. In 2013, the two parallel systems for consumers and HCPs were replaced by a modernized process enabling joint signal detection activities. By this time, consumer reports constituted 20 % of total ADR reporting to the MPA. Before consumer reporting was implemented at the Swedish national center for pharmacovigilance at the MPA, some efforts to develop and promote reporting for drug consumers had been made by a consumer organization, KILEN, which had opened up the possibility of temporary reporting for the public [6, 42].

2.2 Setting up a Patient Reporting System

2.2.1 Means of Reporting

In The Netherlands and Sweden, the processes regarding consumer reports are essentially identical to those processes regarding reports from HCPs. In The Netherlands, there are two ways of reporting for both HCP and consumer reports—an online form and a paper form. The paper form is not actively promoted and can only be obtained upon request. The online form is available through the Lareb website. There are different forms for ADRs (drugs) and adverse events following immunisation (vaccines). The only difference between the HCP form and the consumer form is the wording, as well as additional questions on the consumer form regarding where the drug was obtained, in order to be able to identify over-the-counter (OTC) use, possible counterfeit drugs, etc. The reporting form asks for

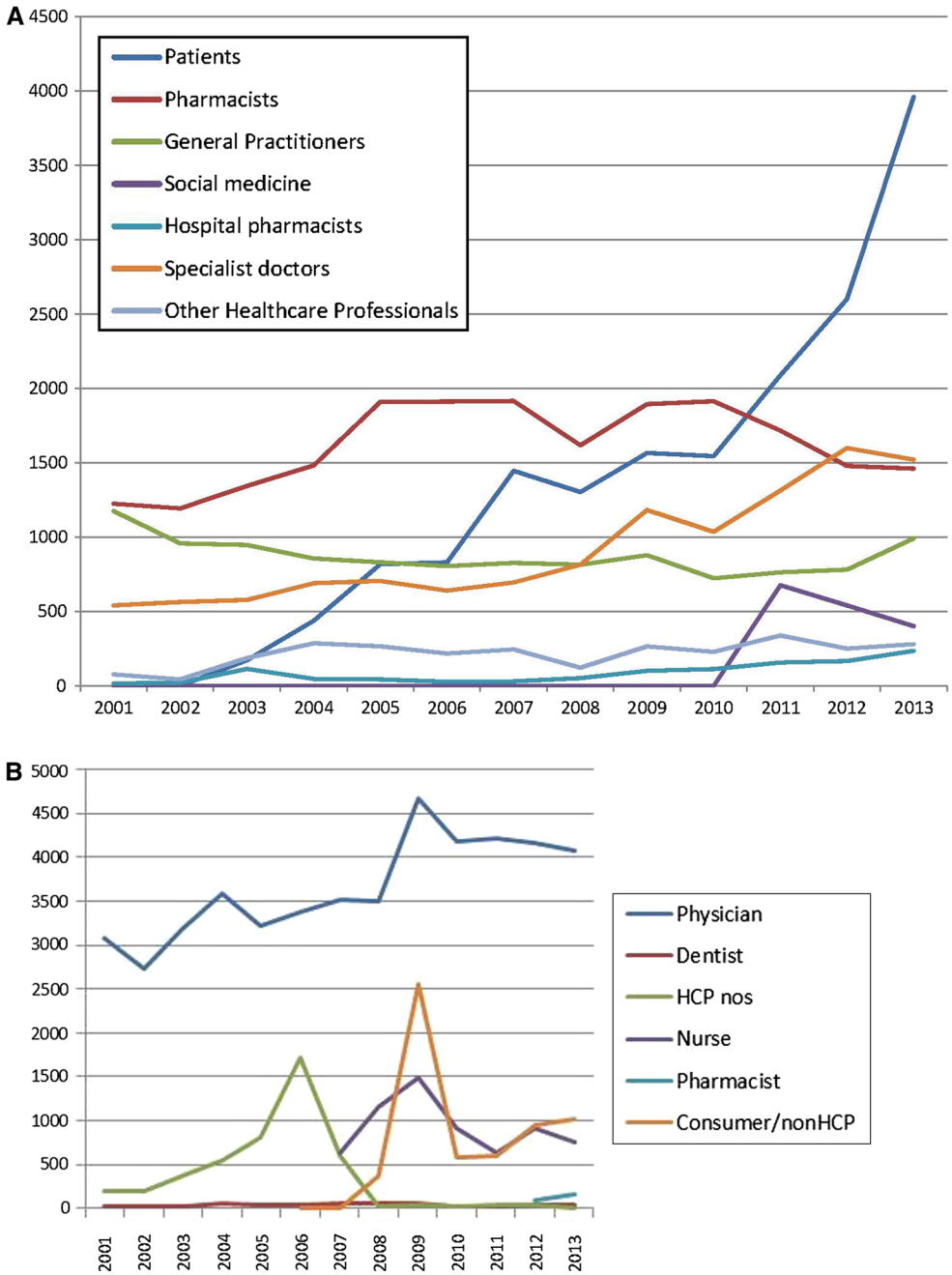

Fig. 1 Number of reports per reporting group (excluding industry reports) during the period 2000–2013 in **a** The Netherlands and **b** Sweden. *HCP* healthcare professional

the ADR to be described in free text, which is considered important to maximally capture the richness of the information that consumers are willing to provide when reporting their experiences. Similarly, in Sweden consumers have the option to report electronically or via a printable form on the MPA homepage, with the same form being used for both vaccines and other drugs. Reporting forms for consumers and HCPs differ somewhat in wording, with layman wording used in the consumer forms, but they do not differ in content.

2.2.2 *Processing of Reports*

All reports received in The Netherlands and Sweden are coded using MedDRA® terminology, entered into an ADR database and assessed by qualified assessors. All individual reports in The Netherlands are discussed in a scientific review meeting to determine which reports will qualify for a signal review (case-by-case review). In Sweden, the process is similar but with selection criteria to identify which reports should be further discussed, e.g. whether the

ADR is already described in the summary of product characteristics, the seriousness of the described event, and the clustering over time of any certain ADRs.

Research (yet to be published) in The Netherlands shows that patients receiving a standard letter are equally satisfied with their feedback as those receiving individual feedback. Presently, in The Netherlands individualized feedback is given only to reporters of serious ADRs and reporters who ask a question. Individualized feedback is also provided for reports in which the assessor wants to recommend the patient to go and see his doctor, reports which might have legal implications and other reports where the assessor feels that individualized feedback is necessary.

In Sweden, an electronic acknowledgement of receipt of the report, including a standard text, is given to reporting consumers.

Since the implementation of consumer reporting, the national centers for ADR reporting in both Sweden and The Netherlands have had the opinion that it is the message that is important, not the messenger, implying that all reports should be handled equally. Combining all reports regardless of reporter type yields the largest critical mass of reports for signal detection and is therefore recommended. In our view, there is no strong case for not handling reports from all sources as similarly as possible in order to enhance signal detection.

2.3 Raising Awareness About Reporting

In some countries, introducing and promoting consumer reporting has been deferred partly due to fear of the system being flooded with reports in amounts difficult to handle. In The Netherlands and Sweden, the increase in consumer reporting is currently considered encouraging; however, compared with the number of consumers who presumably experience ADRs, the ADR reports received by the national centers obviously still only constitutes a fraction of all ADRs actually occurring.

To increase awareness of reporting possibilities, passively informing consumers, e.g. via stakeholders' homepages and via drug product information leaflets, is often carried out. This should be seen as the minimum effort to provide information on reporting possibilities. In contrast to HCPs, the general public could be more difficult to target regarding promotional activities, being a larger and more diverse group of reporters. A recent survey conducted at Lareb among the general public in The Netherlands showed that only 17 % knew that ADRs could be reported to Lareb [44]. In comparison, a survey in the UK found that 8.5 % of the general public knew about the Yellow Card Scheme for reporting ADRs [9]. No similar study has yet been conducted in Sweden. In Australia, 10.4 % knew about the national consumer reporting system but, encouragingly, among Australian consumers who actually had suffered an ADR, 21.2 % had reported the ADR [45]. The general public's awareness about reporting schemes appears to be lower in other countries [6].

With the general public being a large and diverse group to reach, raising awareness of reporting possibilities is time-consuming and expensive. One reasonable solution could be to reach out to this target group through co-operation with other (non-government) organizations.

2.3.1 *Promoting Consumer Reporting Through Cooperation*

Possible partners for promoting pharmacovigilance and consumer reporting are patient organizations. By approaching patient organizations, the general public is more narrowed down (closer) to the drug using target population. In addition, members of patient organizations are also knowledgeable and concerned about their health status and are potentially more likely to report ADRs. The infrastructure of patient organizations offers easy access to the target group. In Sweden, the MPA has been able to use patient organization journals to raise awareness about reporting. In The Netherlands, Lareb is searching for ways to collaborate more intensively with patient organizations, with an online questionnaire tool currently being developed which will be implemented by patient organizations. The aim of the tool is to raise awareness about ADR reporting and also to collect information about ADRs (shortened reporting form).

In Europe, numerous organizations are working with questions regarding pharmacotherapy and ADRs. They range from governmental organizations to non-profit and commercial organizations. Through cooperation, national pharmacovigilance centers could make use of the marketing skills from another party to create awareness and to promote reporting of ADRs. For these organizations, such cooperation may provide the opportunity to contribute to pharmacovigilance in the regulatory context.

Other groups that could prove valuable in increasing ADR reports from the general public are professional organizations. Although patients do report ADRs regarding OTC drugs, there has not been a notable increase in the number of OTC reports since the introduction of consumer reports in The Netherlands. In order to increase the number of reports concerning OTC drugs, a cooperation with the Central Bureau for Drugstores, an umbrella organization for more than 2,600 drugstores in Netherlands, was started. This organization develops and certifies educational materials for personnel working in drugstores. To date, two campaigns have been performed. During the campaigns all participating drugstores had posters in their windows and

all consumers who purchased an OTC drug were given a small card (credit card size) with information on how to report. The campaigns have led to a 170 % (from 51 to 135 reports) increase in the number of reports on OTC drugs, although the absolute number of reports still is low.

In all countries with free mass media, occasional increased attention is given to high-profile ADRs. Such media attention indirectly promotes consumer reporting systems in general and often leads to a higher degree of reporting [23, 46, 47]. Although increased reporting on specific issues due to media attention can raise issues, e.g. regarding biases created in statistical signal detection [48], experiences with reporting after media attention have predominantly been positive and have also led to the earlier detection of new signals and/or strengthening of already detected signals.

Raising the public's awareness of the existence and purpose of pharmacovigilance systems in general will also presumably increase the number of consumer reports. When raising awareness about pharmacovigilance, it is important to show the general public what is done with their information and how that contributes to better pharmacovigilance, e.g. by sharing information about reports submitted to the pharmacovigilance center and which signals have been raised on the basis of the reports.

2.4 The Contribution of Consumer Reports to Pharmacovigilance

2.4.1 Signal Detection

One of the major aims of pharmacovigilance is to detect new signals. The most commonly used definition of a signal is "information that arises from one or multiple sources (including observations or experiments), which suggests a new, potentially causal association, or a new aspect of a known association between an intervention [e.g. administration of a medicine] and an event or set of related events, either adverse or beneficial, that is judged to be of sufficient likelihood to justify verificatory action" [1]. Hence, both previously unknown associations and new aspects about an already known association are considered to be signals.

Studies from the UK and The Netherlands have found positive effects from consumer reporting on signal detection [49, 50]. These findings suggest that consumer reporting may provide a positive complementary contribution to that of HCPs. These studies provide reassurance regarding initial worries expressed in the literature [27] that an increase in the number of consumer reports would only increase distracting 'noise' in signal detection.

2.4.2 Signals Raised Based on Consumer Reports

Consumer reports have been of crucial importance in identifying certain signals. A Dutch example is a signal of electric shock-like sensations [51, 52] associated with the use of duloxetine, a combined serotonin and noradrenalin reuptake inhibitor [53]. This signal, raised by Lareb, was mainly based on well-documented consumer reports [54]. The same ADR had previously been associated with the use of selective serotonin reuptake inhibitors (SSRIs) [55], and this signal was further strengthened with consumer reports [56]. A similar signal was found in the UK where 23 % of consumer reports and 14 % of HCP reports regarding citalopram, paroxetine and venlafaxine included descriptions of 'electric shock sensations' or similar reactions. Compared with the professional reports, consumer reports were particularly vivid, comparing this reaction to a range of other extreme experiences and stressing the severity of the symptoms [9].

Sexual dysfunction is an acknowledged ADR of SSRIs [57]. Although it has previously been assumed that patients always regain normal sexual functioning shortly after discontinuation of SSRIs, emerging evidence suggests that this may not be the case [58]. In 2014, Lareb published a signal, mainly based on consumer reports, of persistent sexual dysfunction in patients who had stopped using SSRIs for 2 months and up to 3 years and who had not regained normal sexual functioning [58].

Recently, patient reports on thromboembolic events associated with the use of cyproterone/ethinylestradiol have provided more insight into the nature and impact of the occurrence and possible lack of recognition of these ADRs in daily practice. They also gave information regarding the widespread off-label use of the product in The Netherlands, an aspect of the safety concern that the HCP reports had not highlighted [46, 47].

In Sweden, a notable example of the value of consumer reporting for signal detection and strengthening was the 2010 signal of narcolepsy following Pandemrix® (influenza H1N1) vaccination. The signal was detected through the HCP system when one doctor reported a handful of cases. Soon after the signal was detected and following media attention on another case, a surge of more than a dozen consumer reports strengthened the signal and boosted further investigation of the ultimately confirmed signal [59].

2.4.3 The Patient Perspective

A qualitative study was performed in The Netherlands which aimed to describe the views of consumer and HCP reporters and pharmacovigilance center assessors on what they consider important information regarding an ADR report. Consumers reported that the severity of ADRs and

their impact on daily life were important information. In the interviews with HCPs, either reporters or assessors, the focus was mainly on causality [60]. Lareb compared ADR reports from consumers and HCPs after the broadcast of a Dutch television consumer programme about the benefits and risks of statins. The additional information regarding the impact of the ADR on daily life, the consumer–HCP relationship, and the effect of the TV programme on drug discontinuation was less highlighted in the HCP reports compared with the consumer reports. Approximately 10 % of the HCP reports provided information regarding the impact of the ADR and reasons for drug discontinuation compared with >50 % of the consumer reports [23].

3 Challenges and Next Steps

With the new EU pharmacovigilance legislation, all European countries have implemented consumer reporting. The challenge for the pharmacovigilance community now is to maximize the relevant use of this new source of information for the benefit of pharmacovigilance and future enhanced patient safety.

As said, the first step is to raise awareness among the general public about the possibility and importance of reporting. However, having a lot of consumer reports is not enough to contribute to pharmacovigilance; the reports should also contribute to signal detection. Signal detection should not only concern the identification of new, previously unknown ADRs. The currently used definition of what constitutes a signal [1], as we have mentioned, also includes 'new aspects of a known association' as a signal. This part of the definition is specifically relevant for consumer reporting. Consumers can, and more often do, provide detailed information about the duration and management of the ADR and its impact on quality of life [35], information that until now has been scarce in pharmacovigilance. Consumer reports bring a new dimension to pharmacovigilance, as the signals described above show, and some signals would have been identified later or not identified at all without the contribution of consumer reports.

Another step to increase the impact, relevance and value of consumer reporting is to continue the scientific research regarding the value of consumer reports. Such research has been performed by some in the European context [8–10]. With recent changes in the regulatory framework regarding consumer reporting, it is also vital to continuously evaluate consumer reporting for groups and national centers who have previously not been engaged in such research since results hitherto presented may not immediately be generalizable to other countries or settings (the same being true for HCP reports).

Recent examples of initiatives in Europe aiming to improve pharmacovigilance by incorporating and strengthening consumer reporting of ADRs are discussed below.

3.1 SCOPE Joint Action

The Strengthening Collaboration for Operating Pharmacovigilance in Europe (SCOPE) Joint Action has been created to support operations of pharmacovigilance in Europe following new requirements introduced by the 2012 European pharmacovigilance legislation. Funded by the European commission and with contributors from EU member states' National Competent Authorities, SCOPE systematically gathers information and knowledge on how member states run their national pharmacovigilance systems with the aim of delivering guidance, training in key aspects of pharmacovigilance, and tools to support best practice on a national level. One of the aims of the SCOPE project is to develop a better understanding of, and develop best practice in, reporting mechanisms for ADRs, also taking consumer reports into account [61].

3.2 WEB-RADR (Recognizing Adverse Drug Reactions)

The need for leveraging emerging technologies for pharmacovigilance was recognized by the Innovative Medicines Initiative, a public–private partnership between the EU and the European pharmaceutical industry [62]. The project, WEB-RADR, brings together academic and industry researchers with the aim of developing, implementing and evaluating reporting by means of mobile phone and the detection and strengthening of safety signals from social media. The first product to be developed in this project is a mobile phone application for direct reporting of ADRs to national authorities. The second product is an online dashboard and data feed of auto-tagged and curated data identifying ADRs from social media in multiple languages [63]. Parallel to the development, evaluation and implementation of these products, a policy framework for the use of mobile devices and social media in the context of the EU medicines regulation and data protection legislation, which aims to support further development of Good Pharmacovigilance Practices (GVP) and other guidance in this area, will be developed. The project started in 2014 and will run for 3 years [62].

3.3 Patient-Reported Outcomes in Pharmacovigilance

Consumer reporting is a form of a PRO. In recent years, PROs have become increasingly used across the spectrum of general healthcare and life sciences. PROs encompass

the full range of self-reporting, rather than only patient reports collected by clinicians using validated instruments. Technological advancements have made it easier for patients to become active participants in their own healthcare. Simplified Internet searching capabilities, personal electronic health records, digital mobile devices, and PRO-enabled patient online communities are just a few examples of tools that allow patients to gain increased knowledge about conditions, symptoms, treatment options and side effects [64]. The Patient-Reported Outcomes Safety Event Reporting (PROSPER) Consortium, managed by Pope Woodhead and Associates Ltd, was convened to improve safety reporting by better incorporating the perspective of the patient [64].

Since 2006, PROs are also collected via an intensive monitoring system in The Netherlands. Intensive monitoring, also called prescription-event monitoring or cohort-event monitoring, is a non-interventional observational cohort, differentiating itself from spontaneous reporting by actively monitoring real-life use for selected drugs during defined periods of time. In this web-based intensive monitoring system, information obtained on drug use and adverse events originates from the patient. Patients eligible for inclusion are identified in the pharmacy when filling the first prescription of a drug under study. The patient is informed about the intensive monitoring study and is asked to participate. On registration, patients are asked for an e-mail address for further correspondence. After registration, the patient receives questionnaires by e-mail at prespecified points in time, including questions and details on possible ADRs. Using this systematic data collection, more information about ADRs has successfully become available [65].

Despite the increased attention on the perceived value of PROs, their full potential has yet to be realized in pharmacovigilance. Patients submitting reports to a spontaneous reporting system, intensive monitoring and social media data mining, as described above in the WEB-RADR project, are ways to use PROs in pharmacovigilance, but the possibilities are endless and need be further explored and evaluated.

3.4 WHO Collaborating Centre

The WHO has acknowledged the importance of the development and contribution of consumer reporting to pharmacovigilance by appointing The Netherlands Pharmacovigilance Centre Lareb as a WHO Collaborating Centre in Pharmacovigilance for Education and Patient Reporting [66]. As a WHO collaborating center, Lareb will assist the WHO and member countries in the further development of consumer reporting systems, work with the WHO in providing training to member countries in handling consumer reports, and the identification and investigation of the value of additional data sources such as reports submitted by consumers to pharmacovigilance [67].

4 Conclusions

With this review, we have tried to share some practical experiences of consumer reporting gathered in the past few years. The article is by no means an exhaustive review on consumer reporting in Europe but has been written from the perspective of the authors.

Consumer reporting of ADRs is a rapidly evolving field. It increases reporting of ADRs and can help in the earlier detection of ADRs. It gives new perspectives on the consumers' own unfiltered experiences of side effects of drugs in a way not otherwise available. With the development of national systems for consumer reporting partly propelled by regulatory demands and the rapid development of the Internet and social media, consumers have the potential to play a major role in pharmacovigilance of the future. The consumers' view might change the way we look at the benefit–harm evaluation of drugs today. Consumers' opinions will be able to play a greater role in the regulatory decision-making process of the future. As consumers are the ultimate users of drugs, this is the way forward. It is now in the hands of all pharmacovigilance stakeholders to embrace the increased participation and information from consumers.

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