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**Are Drug Safety Advisories  
Compatible with Physicians'  
Information Behaviour?**DOI: 10.47368/ejhc.2022.301  
2022, Vol. 3(3) 1-17  
CC BY 4.0**Semi-Structured Interviews with General  
Practitioners about Direct to Healthcare  
Professional Communication****Mathias Møllebæk , Susanne Kaae **Department of Pharmacy, Faculty of Health and Medical Sciences, University of  
Copenhagen, Denmark**Abstract**

Physicians critically depend on up-to-date risk information when prescribing drugs, but they typically have little time to navigate the vast information. In the European Union, Direct to Healthcare Professional Communications (DHPC) letters are distributed to physicians to mitigate drug risks that emerge after market approval, but the letters show low impact. This study characterises general practitioners' (GPs) information behaviour regarding drug safety and assesses the compatibility of DHPCs with the identified information behaviour. We conducted 17 semi-structured interviews and four follow-up interviews with Danish GPs about safety concerns and analysed them using Wilson's model of information behaviour. We found that GPs primarily use an online drug monograph for point-of-care information needs and a newsletter from the authorities for clinical management strategies. They generally did not consider DHPCs a useful source of information. GPs argued that numerous sources contained the same information as the DHPC and believed these to be superior in terms of convenience, clinical relevance, and quality of evidence. A new digital mode of DHPC delivery from a public authority may improve the general adoption but also generated new problems. Overall, this suggests that DHPCs in their current form are not very compatible with information behaviour of GPs.

**Keywords**

Direct to healthcare professional communication, drug safety, general practice, information behaviour, interviews.

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When a pharmaceutical drug is approved for the market by regulators, its risk-benefit profile is only partially established due to the inherent limitations of clinical trials. Much is learned about the risks and benefits of a drug when it is taken up in real-world settings. The physicians who prescribe the drugs not only depend on official pharmacovigilance specialists to monitor the potential emergence of safety issues, they also depend on effective risk communication about safety issues if they emerge, which is the case for more than a quarter of all new drugs approved for European market (Rubino & Artime, 2017). In the European Union (EU), this risk communication typically takes the form of a Direct to Healthcare Professional Communication (DHPC) letter (*Community code relating to medicinal products for human use*, Directive 2010/84/EU; Directive 2001/83/EC). So, if an emergent risk is detected after market approval and routine risk minimisation measures (e.g., the package inserts) are deemed insufficient for mitigating the risk, the European Medicines Agency (EMA) may require that the manufacturer in question issue a DHPC to relevant prescribers and that an evaluation of its impact is undertaken. Internationally, drug regulators issue similar safety advisories directly to prescribers, although there can be discordancy in which safety issues are communicated (Dal Pan, 2012; Perry et al., 2019; Zeitoun et al., 2014). In USA, the Food and Drug Administration (FDA) releases Drug Safety Communications and Dear Health Care Provider Letters (Food and Drug Administration, 2014); in Australia the Therapeutic Goods Administration disseminate Medicines Safety Updates (Therapeutic Goods Administration, 2020); and Health Canada disseminates Dear Health Care Professional Letters and Safety Review Summaries (Health Canada 2008, 2020). In each jurisdiction, health care professionals (HCPs) have a range of different sources of drug safety information at their disposal (Kesselheim et al., 2017).

Despite their widespread use, research suggests that regulatory drug safety communications, including DHPCs in the EU, perform sub-optimally (Dusetzina et al., 2012; Piening et al., 2012; Vora et al., 2018). In the EU, the impact evaluations from drug manufacturers indicate that DHPCs (and other forms of drug safety communication) have varied and often limited impact on prescription behaviour (Vora et al., 2018), although emergent survey research suggests that most recipients report taking action on DHPCs (de Vries et al., 2017). While recent research has examined the characteristics and communicative circumstances of DHPCs in more detail, such as the quality of monitoring instructions in DHPCs (Højer et al., 2020) and the relation between medication errors and DHPCs (Hoeve et al., 2021), research on the explanatory factors in the suboptimal performance remains limited (Møllebæk et al., 2019).

Recently, the need to evaluate the content, format, and delivery strategies of drug safety communication among its intended recipients (usually physicians) has been recognised in drug safety research to understand the limited impact of DHPCs (DeFrank et al., 2019; Møllebæk et al., 2019; Russell et al., 2020), and frameworks for formative evaluation approaches have been suggested (Morrato & Smith, 2020; Russell et al., 2020). This literature incorporates concepts from health risk communication literature which recommends that process and outcome evaluation (i.e., the evaluation approaches proposed in EMA guidance for drug manufacturers' evaluation of risk minimisation measures [European Medicines Agency 2014]) is complemented by user-oriented, formative evaluation to ensure that content, form, and mode of dissemination are fitting to the intended recipients and context (Bowen, 2012; Council of Canadian Academies 2015; Fischhoff, 2011). Such formative evaluation approaches emphasise that the recipients' recognition of a need for medical information is a strong indicator for adoption (Gorman, 1995), that the reception of information generally occurs in an abundance of information (Smith, 2010), that recipients' preferences for information sources, and their

information-seeking and information-using behaviour are determining factors in communicative interventions to bring about change in clinical practice (Le et al., 2016).

Hence, to understand why DHPCs are not performing as intended to mitigate risks of drugs, and to understand how the information behaviour of physicians appear essential in this regard, the aim of this study is to explore the compatibility of DHPCs with the recipient prescribers' information behaviour, i.e., their need for, search for and use of drug safety information in daily clinical practice. Therefore, the objectives of this article are 1) to characterise the general safety information behaviour of a sample of general practitioners (GPs), and 2) to assess to how DHPCs as an information source are compatible with the general drug safety information behaviours of GPs.

Six months after data collection of the study was finished, the national drug regulator overseeing the dissemination of DHPCs changed the mode of dissemination, so prescribers now receive DHPCs from a public authority on patient safety in their *E-boks* (a digital post-box primarily for communication between citizens and public authorities) instead of a hardcopy (Ministry for Industry Business and Financial Affairs 2018). To include a characterisation of this change, we extended the data collection with five follow-up interviews that aimed to explore GPs' attitudes towards the new mode of dissemination.

## Method

We designed a study with semi-structured interviews in which recipients (prescribers) of DHPCs outlined their general drug safety information behaviour which then formed the basis for discussing the adequacy of DHPCs. The interview study was carried out in Denmark.

An in-depth single case study design was employed because it allows for uncovering multiple perspectives on a specific, complex issue in the daily clinical context (Simons, 2009). For interview studies specifically, a single case that relates directly to concrete situations thereby facilitates more detailed and nuanced responses (Kvale & Brinkmann, 2009). We chose to interview GPs because they constitute the largest subgroup of recipients of DHPCs (3402 fulltime physicians in 2018 [The Danish Organization of General Practitioners 2019]). Moreover, GPs who prescribe a wide range of drugs rely more on the dissemination of targeted drug safety information from authorities than other medical specialities who work with fewer drugs for which they more likely to learn about new drug safety concerns on their own accord. We chose a 2013 DHPC about emergent safety risks in direct oral anti-coagulants (DOACs; i.e., Dabigatran, Pradaxa, Apixaban and Rivaroxaban) and the reception of this letter among Danish GPs.

In Denmark, as in several other European countries, the clinical management of patients treated with DOACs involves both primary and secondary care physicians. The 2013 DOAC DHPC was selected as a case because GPs prescribe DOACs relatively often (compared to other drugs subject to DHPCs), making the DOAC DHPC an optimal case for that GPs to describe and discuss their clinical risk management routines in terms of information behaviour during the interviews.

### *Physician Recruitment*

Eligible participants were defined as certified physicians in primary care. To have a sufficient sample, participants were enrolled both through invitations posted in three central professional

organisations for GPs, unsolicited phone invitations (“cold calls”) and chain referral (“snowballing”). Participants for follow-up interviews were randomly selected among the participants from the primary interviews and recruited via email invitations. Participants were offered honoraria equivalent to the hourly rates for consulting as set by GP unions. Consent to participate was collected individually prior to the interviews. No formal approval for the study is required under Danish law.

### *Interviews*

For the primary interviews, the interview guide covered 1) perceived need for drug safety information, 2) preferred sources of drug safety information, 3) information-seeking and information-using behaviour, and 4) assessment of relevance of the specific DOAC DHPC case. Additionally, prescribers were asked about their experience with prescribing DOACs, and dabigatran in particular (see Appendix 1 for interview guide). For interview topics 1-3, DHPCs were not introduced before topic 4 to avoid priming bias. For the follow-up interviews, the participants' awareness and attitude towards the recent change in mode of delivery was examined. Participants were asked whether they had registered any changes in dissemination of information to them and if so, what their opinion was of these changes.

Interviews were conducted in face-to-face sessions of approximately 40 minutes in their clinic or private home. Interviews were transcribed verbatim and imported to NVivo 12 (QSR International, LLC). Interview transcripts were analysed concurrently with conducting interviews in order to make adjustments to the interview guide as new information was acquired and to achieve exhaustive saturation of the data. Data saturation is characterised by the replication of information in interviews (i.e., when the data from several participants share essential characteristics and little new information can be expected), and the comprehensiveness of data (i.e., detailed information about the domain, in-depth understanding of the research topic, and plenitude of examples; Kvale & Brinkmann, 2009; Morse, 2015).

### *Qualitative Analysis*

The analysis of primary interview transcripts proceeded with open, line-by-line descriptive coding, which assigns codes to words or phrases that capture the topic of the statement (Saldana, 2013). The analysis focused on shared or opposing expressions of needing, seeking, using, and evaluating drug safety information. In this analytical process, a number of codes was accrued and organised. In the process of coding, 26 initial themes were identified and then reduced to 15.

Wilson's model of information behaviour (see Figure 1; Wilson, 1999) was then applied to analyse interview themes. As noted, information behaviour encompasses the behaviours of needing, seeking, and using information, including purposive behaviours that disregard information, as well as less recognised or passive behaviours (such as “glimpsing” information; Case, 2007). The model conceptualised phases from the initial recognition of an information need to its satisfaction (or lack thereof). In breaking down this process into six phases, the model identifies several variables that may influence the adoption of information for solving a task at hand. Hence, this model approach enables further insight into how GPs in this specific setting seek and use information.

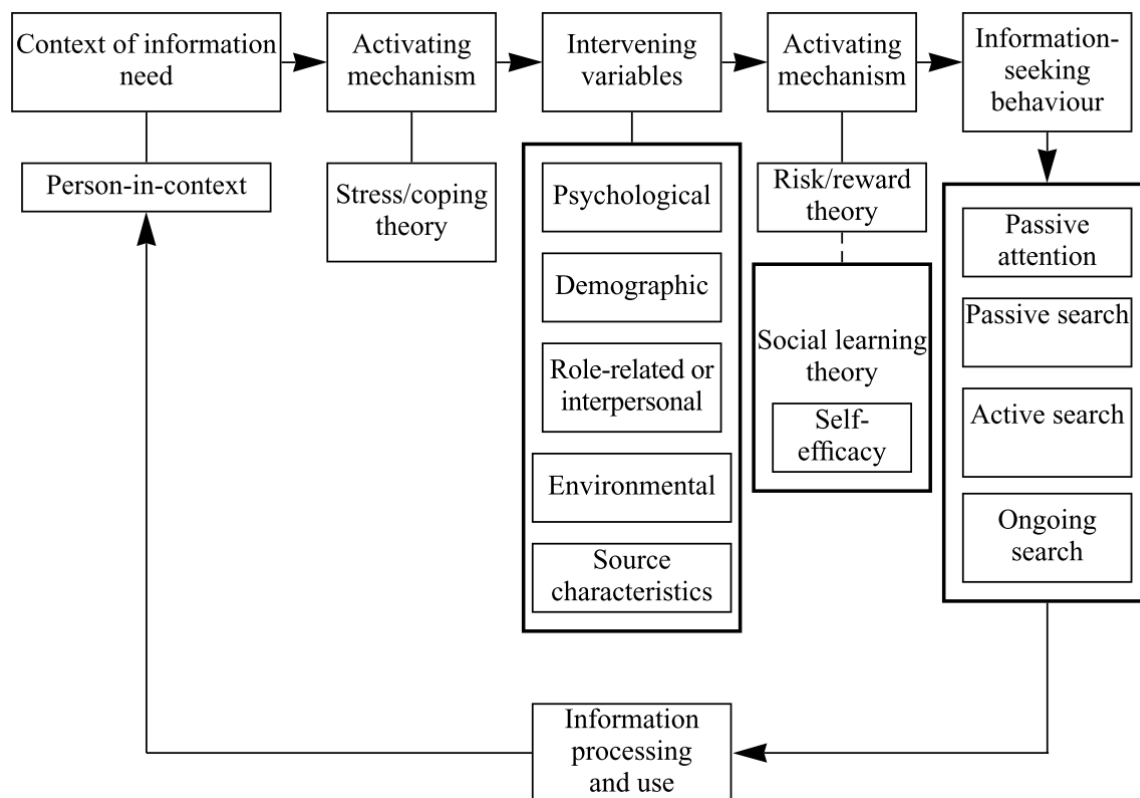


Figure 1. Wilson's 1997 Model of Information Behaviour

Reading the model from left to right, the central concept is the information user, or *person-in-context*, who relies on information to handle a task at hand such as prescribing. The *first activating mechanism* describes the emergence and recognition of inadequacy of current knowledge to accomplish a goal, i.e., the information need, and includes potential explanations for why the need may not invoke information seeking. The *intervening variables* describe aspects that may be both supportive and preventive of information seeking. The *second activating mechanism* describes the intermediary phase between determining information need and taking action to satisfy it. The outcome is an *information-seeking behaviour* which may in turn lead to the retrieval, processing and use of information or the retrieval of dissatisfactory information, which circles back and confirms in the initial inadequacy of current knowledge to accomplish a goal.

Hence, after identifying themes from our interviews using descriptive coding, we applied the model of information behaviour by organising interview themes according to the phases of the model and elaborating on the interview themes using the concepts of each phase of the model. This produced an overall characterization of GPs' information behaviours which we then compared with the GPs' perceptions of the case-DHPC about DOACs in order to assess their compatibility.

## Results

We conducted seventeen interviews with primary care physicians between February 2018 and November 2018, and subsequently we conducted four follow-up interviews between June 2019

and August 2019 (change of mode of disseminating DHPCs was implemented on 1 May 2019; see Table 1 for participant characteristics). Interview participants were recruited through posted invitations (one physician), 54 telephone invitations (three physicians) and chain-referral (13 physicians). Of the 54 telephone invitations, 51 declined and time constraints were the predominant reason given for not participating. Subsequently, four interview participants were recruited to participate in follow-up interviews. The overall results are divided into the two aims of the study and then further divided into the different phases of Wilson's model of information behaviour. Illustrative quotes from each phase are presented in Table 2.

*Table 1.* Characteristics of Participating General Practitioners

Characteristic	<i>N</i>
<i>Total</i>	17
Years in practice	
<5 years	6
5-20 years	6
>20 years	5
Gender	
Male	8
Female	9
Region	
Capital	13
Zealand	3
Southern	1
Central	0
North	0

*Table 2.* Illustrative Quotes

Component	Illustrative Quotes
First activating mechanism: Perceived need for drug safety information	<p>"[My need for information on drug safety] is very big. Before I put someone on a drug, I sit there with the patient and look at the [adverse reactions] table on <i>pro.medicin.dk</i>, and talk it through."</p> <p>"Our need [for drug safety information] is very big... In general practice we don't operate much. We might remove a little thing. We are not dangerous in that regard. But we are dangerous with medicine."</p>
Psychological variables	<p>"You come out of medical school with a high level of textbook knowledge and an ambition to have the evidence top-of-mind at all times. But over time you add other kinds of knowledge in other compartments of your mind, and you think 'Well, what I am seeing with this patient is the same as what I was seeing with that other patient back in '92'"</p> <p>"No matter how cognizant and smart you might think you are, you get influenced by a tabloid front page designed to get people to buy the paper. No matter how much you might know, it says that 'Now there are too many patients on statins' and 'This drug for atrial fibrillation is extremely dangerous.' There are always these waves going back and forth."</p>

Table 2. Illustrative Quotes (continued)

Component	Illustrative Quotes
Variables relating to professional role and environment	<p>“There is a growing sea of associations and stakeholders who are keen on having me focus on their particular, little thing. As a result, a kind of fatigue sets in when you think ‘God, that’s right, I need to know that, too’ or ‘Damn, I really need to work hard at this.’ Then finally you realise; ‘I can’t do that.’ Things change so quickly nowadays, and you can’t be up-to-date on all that knowledge and keep it top-of-mind, as you used to. You need to work much more <i>ad hoc</i>.”</p>
Sources of drug safety information	<p>“We get a pile of papers in every day from the pharmaceutical industry, advertisements, magazines, and I don’t know what. But sometimes there is also a letter about ‘this and that drug has been found to have a new side effect.’ But for some reason it ends up in the same pile as all the other letters from there. Whereas I think, if it came from the Section of Rational Pharmacotherapy [under the Danish Health Authorities] ... it would be something we would notice more. It makes a difference.”</p>
Second activating mechanism: Reacting to information needs	<p>“I have been a general practitioner for 10 years, and I have always had [a relatively large need for knowing about drug safety], because I have never had automated knowledge about pharmacology. So, in that regard I work very consistently with supplemental knowledge about medicines. So, even if I have prescribed penicillin for kids a thousand times now, I always look it up while I have them on the line. I always have [<i>Pro.medicin.dk</i>] in front of the parents, the list of adverse reactions, and stuff like that, so I can look it up easily. I do that very consistently.”</p> <p>“When I am holding the medication in my hand, so to speak, I go on <i>pro.medicin</i> and check up on the side effects... Right now, actually, I have one who is on Marevan [warfarin] and who would like to switch to another anticoagulant, a NOAC, that is. And I am not sure which one I should switch to. Here, I need time to sit down with a colleague and look it up, and I will say “What do you think?”, and then we will try to get an overview of pros and cons. And maybe I will search for an overview article in the Monthly [publication for general practitioners]...Now we also have a nurse, she knows a lot about these things, and she is updated, so I will use her. Or I might call a cardiologist...”</p>
Perception of DHPCs as drug safety information	<p>“I mean, the way they set it up where they have the drug names like that. Yeah, it looks like it’s a notification from a company.”</p> <p>“To me, they are regulatory ‘you-<i>have-to-do-this</i>’ warnings and not something that is clinically helpful. It is often oncology drugs, and about three out of four warnings are not relevant for us in primary care.”</p> <p>“This is a medical company writing... We don’t get things like this anymore. Now we don’t get anything from medical companies. We are a ‘Doctors without sponsors’ practice. So we don’t get any advertisements at all. I expect that this would be thrown out too - which you can discuss, of course. It shouldn’t be.”</p>
Attitude towards the changed mode of delivery of DHPCs	<p>“I think it is ridiculous that my private [email] is used for this purpose just because I am a physician... If you really have to use my private [email], I should be close to killing someone, and it should be targeting me specifically.”</p>

### *Research Objective 1: What Characterises the General Drug Safety Information Behaviour of GPs?*

**First Activating Mechanism: Perceived Need for Drug Safety Information.** The GPs reported that drug safety is an important point of attention for them because the routine of prescribing drugs and consulting patients on potential drug risks are central to their daily work. When asked about their need for drug safety information, most interviewees stated that their need was significant. Four reasons for this were given. First, drugs are the primary therapeutic option in general practice. Second, GPs see a wide variety of patients, prescribe a variety of drugs and treat a large group of multi-morbid patients who require specific knowledge about drug-drug interactions and polypharmacy. Third, the current imperative to discontinue drugs was reported as a significant reason to be aware of drug safety information. Fourth, GPs are the responsible for clinical management across all significant health events, including prescription and monitoring of medicines outside of hospitals.

**Intervening Variables: Psychological.** While all GPs noted the need for an evidence-based approach to drug safety, several GPs discussed different cognitive biases that they acquired with clinical experience. The predominant bias was a confirmation bias in which the GP would overestimate a drug safety risk in one patient because the GP had experienced it with another patient previously. Furthermore, numerous GPs mentioned an increased attention to specific drug risks as a result of mass media coverage. In some cases, mass media caused an increase in patient contact and required GPs to seek specific information and clinical practice guidelines from public authorities or medical societies for information.

**Intervening Variables: Professional and Environmental.** Even though GPs found drug safety important and central to their daily work, GPs found it challenging to stay sufficiently up-to-date on safety. Several interviewees openly questioned whether they themselves were up-to-date but also whether being up-to-date on drug safety was imperative to their work as GPs. Moreover, environmental aspects such as time were highlighted. GPs questioned whether it was even possible to be up-to-date of drug safety given the time constraints in general practice and the amount of scientific knowledge they would have to consult continuously to ensure they were up-to-date on all drug safety information for all the drugs they prescribe. The wide spectrum of medical knowledge demanded of the general practitioner, they argued, inhibits going in-depth with drug risks.

**Intervening Variables: Source Characteristics.** Figure 2 depicts which sources of information were used by GPs for drug safety information. Almost all GPs relied on two sources for drug safety information: a searchable online drug monograph, *pro.medicin.dk*, and newsletters from Section for Rational Pharmacotherapy under the Danish Health Authority. *Pro.medicin.dk* is a publicly accessible database of drug information that includes approved indications, dosage recommendations, known risks and interactions, and price and reimbursement status. It is owned and operated by The Danish Association of the Pharmaceutical Industry and financed by fees from manufacturers of listed drugs. Their editorial policy states that authors are independent medical experts and that they have instituted a scientific advisory board with representatives from the Danish Medicines Agency and the Danish Health Authority. The other dominant source of drug safety information was newsletter distributed by the Section for Rational Pharmacotherapy. All interviewed GPs stated that this



information was influential to their prescribing, and they were generally held in high regard for their clarity and clinical relevance in matters regarding drug safety.

**Second Activating Mechanism: Reacting to Information Needs.** GPs routinely consulted the online drug monograph, *pro.medicin.dk*, in point-of-care situations when they are in the consultation room with a patient, and most GPs said that they would often talk a patient through the drug safety information on the screen. GPs explained that routinely consulting the drug monograph was typical, not due to the complexity of prescribing but rather as a way of safeguarding against mistakes. In other words, rather than merely extract information, GPs also use information to reassure themselves of their prescribing routines. Newsletter articles from the Section for Rational Pharmacotherapy and other sources are not consulted in point-of-care situations but read outside of patient consultations as an effort to keep up with the literature in off hours or as part of continuing medical education meetings and workshops. When GPs revise clinical management strategies, they often consult multiple sources to triangulate knowledge. In cases where GPs are less sure of the best course of action, they elicit advice from colleagues and go through the information with them.

Three GPs noted that the drug risks listed on *Pro.medicin.dk* were occasionally problematic because they were based on very few cases or spontaneous reports alone. Despite this, the ease of use and clear interface were the primary reasons for it being the preference among GPs. Other sources that GPs consulted included treatment guidelines on the webpages of relevant medical associations.

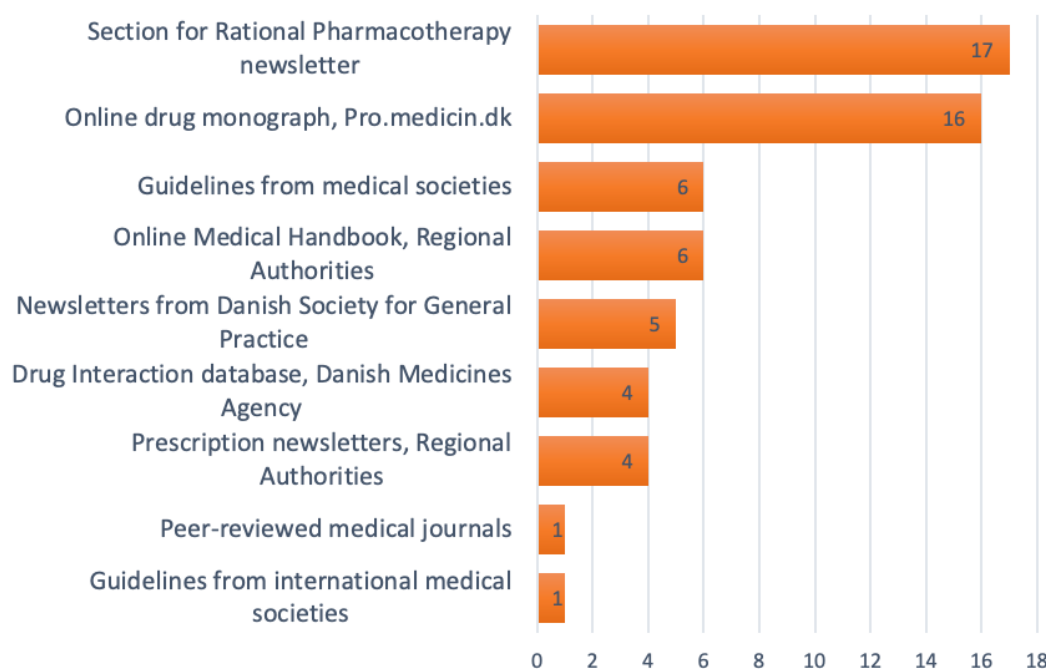


Figure 2. Drug Safety Information Sources used by Participating General Practitioners

## *Research Objective 2: Are DHPCs Compatible with the General Drug Safety Information Behaviour of General Practice?*

**Perception of the DOAC DHPC as Useful Drug Safety Information.** When presented with the specific example of a DHPC, all GPs except one recognised the type by its formal characteristics (its layout, salutation, brand names as the primary drug identifier etc.). However, GPs stated that they typically disregarded DHPCs because they associated them with outreach activities from the pharmaceutical industry and assumed that they were biased by commercial interests of the industry despite that they were endorsed European and national regulators. Most GPs intimated that the national regulators were primarily a market gatekeeper, and they explicitly perceived the Danish Health Authorities, which is a different institution, to be the main authority on drug safety. Some stated that they did not receive DHPCs anymore because they had banned all incoming mail from industry. Furthermore, GPs perceived DHPCs to be irrelevant to general practice because they mainly concerned drugs prescribed by hospital-based specialists. Lastly, the recommendations provided in DHPCs were, by some GPs, perceived as detached regulatory obligations devised with little regard for primary care and as an example of defensive intentions to disclaim responsibility for potential adverse drug reactions. The GPs mentioned numerous sources that they expected to contain the same information as the DHPC and believed to be superior in terms of convenience, clinical relevance and quality of evidence, hence, making the DHPC redundant considering the other experienced limitations.

**Attitude Towards the Changed Mode of Delivery of DHPCs.** All four participants in the follow-up interviews were aware of the change of the distribution system in May 2019 prior to the first interviews. They mentioned the change unprompted, and they all expressed dissatisfaction with the change. Two cited a discussion in the Facebook group for members of the Danish College of General Practitioners and inferred that the dissatisfaction was shared by a majority of GPs. Specifically, they were uncomfortable with receiving work-related emails in their private digital E-boks. It was experienced as a breach of the division of professional and private domains. Secondly, they suspected that DHPCs would be read less thoroughly, if at all, because the E-boks was usually accessed for private affairs in off-hours. Third, the E-boks interface made it more difficult for them to forward the DHPCs to clinical colleagues for whom they may be relevant. However, it was generally noted that a digital solution was preferred for hard copies of emergent drug safety information.

## **Discussion**

GPs reported a significant need for drug safety information and described two drug safety information behaviours: the active point-of-care search for and use of safety information in patient consultations, and the passive attention to trusted sources (such as guidelines and newsletters) which may prompt revisions of clinical management strategies. However, they also noted that time constraints and the diversity of clinical issues they are confronted with inhibited them from going in-depth with emergent drug safety concerns for the drugs they prescribe. Furthermore, GPs generally disregarded DHPCs because they suspect that they are commercially biased and lack clinical relevance. On the background of this information behaviour, DHPCs did not seem very compatible because they do not present information in a

way that makes it operational in a clinical situation, nor comes from a trusted source. While a new mode of digital DHPC dissemination in Denmark solved some of the critical issues that the previous dissemination of hardcopy DHPCs exerted, it also created new concerns, primarily that the use of private emails for DHPCs transgresses the boundary between professional and private spheres.

The prevalence of two information behaviours rather than one demonstrates that GPs have more complex ways of acquiring and using drug safety information than anticipated in guidelines and models for risk minimisation measures and safety advisories, which generally operate on the assumption that prescribers have a singular information behaviour and will adjust their prescription behaviour for a specific drug when presented with emergent safety information regardless of content, format, and mode of delivery (Banerjee et al., 2014; European Medicines Agency 2014; Prieto et al., 2012). In contrast, the results of this study suggest that GPs have more than one type of information behaviour and that they adapt to different demands in clinical situations by adjusting the information behaviour. The discrepancy between the modelled and the empirical information behaviours suggests that safety advisories which are developed and disseminated on the basis of these models (e.g., DHPCs) will lack compatibility with the dominant information behaviours and result in poor adoption.

While the GPs reported two separate information behaviours with specific purposes, existing literature on knowledge management in primary care suggests that the GPs' information behaviour is more likely to be a hybrid form that can be placed on a continuum between these two types (Gabbay & le May, 2004). Given the range of different types of drug information produced for prescribers and the literature on information overload of physicians, (Hall & Walton, 2004; Smith, 2010), it is not surprising that GPs have differentiated information behaviours for different situations. Nonetheless, the prevalence of two different types of drug safety information behaviours and their deviation from the modelled information behaviour are novel findings in the context of drug safety information, and they strongly suggest that the models on which safety advisories are based should be revised to accommodate these insights.

The complexity of prescribing drugs to multimorbid patients in general practice animates significant needs for information and guidance on drug safety. This contradicts the reported perception that physicians rarely reflect on the adequateness of their knowledge on drug safety (Boskovic et al., 2020). In fact, numerous GPs were acutely aware of the limits of their knowledge and the potential fallibility of their cognitive models for handling clinical drug safety issues. However, the environmental aspects of general practice such as time constraints and the diverse array of clinical issues limit the GPs' capacity for engaging with scientific evidence on the topic, which are well-known barriers for implementation of evidence-based medicine in general practice (Zwolsman et al., 2012). Despite the recognised need for drug safety information, GPs disregarded DHPCs and perceived them to be inferior in comparison to other sources of information, and as attention and time are scarce resources in general practice, DHPCs are likely to be disregarded if better alternatives are available. In contexts where this is not the case, DHPCs may be highly valuable. Danish GPs mention numerous sources that they expect to contain the same information as the DHPC and believe to be superior in terms of convenience, clinical relevance and quality of evidence. The results suggest that the unique organization of drug safety information in national healthcare systems is a key factor for the communication of emergent drug safety information. Although a recent survey among

healthcare professionals in 23 (de Vries et al., 2017) European countries (citation?) indicated that the national competent agency was the preferred source of safety information across countries, the Danish competent agency was not mentioned once when GPs were asked about their sources for drug safety information. When prompted about the national competent agency and DHPCs, GPs largely disregarded DHPCs and intimated that the national competent agency was primarily a market gatekeeper. That the primary information sources were a privately operated online drug monograph and a newsletter from a public authority other than the national competent agency indicates that the unique features of national healthcare systems influence how emergent drug safety information is adopted by prescribers. Furthermore, the description of information behaviours raises questions about the appropriateness of a universal risk mitigation instrument for all EU member countries. While the early evaluation of the European 2012 pharmacovigilance reform suggests that it has improved public health overall (European Medicines Agency 2019), this study raises questions about whether the substantive design and implementation of additional risk minimization measures should be a national rather than a supranational responsibility. The findings in this study suggest that many factors specific to national healthcare systems influence the performance of risk minimisation measures (e.g., that the national competent agency is not the preferred channel for drug safety information), and therefore rather than employing a stand-alone, universal approach to drug safety communication, regulatory risk minimisation measures like safety advisories should be integrated with established sources of drug safety information and clinical guidance to improve their performance. Further studies are needed to determine whether there is significant variance between countries and on that basis assess the adequacy of the current form of DHPCs. More specifically, such studies should examine how emergent drug safety information is covered by sources that are preferred by prescribers and assess how further integration and partnership is possible.

Finally, this study illustrates the value of a user-centred, formative evaluation approach by contributing new, context-specific findings that suggest more practical improvements of the design of drug safety communication. It has demonstrated that the application of qualitative methods in an examination of small cohort of recipients' motivations, preferences, and behaviours can provide relevant and new insights on the implementation of risk mitigation interventions (Fischhoff, 2011). T.D. Wilson's model of information behaviour provided a useful resource for connecting the interview themes and relating them to information-seeking and information-using concepts. Future studies should expand the use of such information behaviour models beyond the data analysis and include them the development of data collection procedures. Moreover, the study demonstrates the complementary value of exploratory evaluation approaches which identify "how" and "why" factors of drug safety communication effectiveness to confirmatory approaches that are employed to evaluate the impact of a risk minimisation intervention on pre-determined outcomes (Council of Canadian Academies 2015).

### *Strengths and Limitations*

This is a single-case study design with a sample of a type of physicians, namely GPs. Following an explorative approach, the study presents novel results about the context and adoption of DHPCs in general practice, and efforts to confirm or validate the results in other ways would require surveying a larger sample.

It is not within the methodological scope to produce generalisable results about other types of physicians nor physicians outside of the selected context. However, the results are expected to be transferable to other GPs, physicians, and health professionals as they centre around some more fundamental aspects of the use of DHPCs with regard to convenience, clinical relevance, and quality of evidence. The specific clinical work routines of the individual health professional, the organisational context, and even the health system are, however, all factors that might influence how these essential issues unfold. While the selected case revolves around specific risks for dabigatran and DOACs, the information behaviours characterised above are unlikely to depend significantly on this choice of case. Participant GPs described their information behaviours in general, everyday terms, and it is unlikely that other drugs and safety concerns would cause different information behaviours. Ideally, the study could be carried out with a more recent DHPC, we contend that the methodological importance of a clinically relevant drug and safety issue overrides the importance of recency of the case-DHPC. A limitation of the study is that most participants were employed in the Capital Region in Denmark (Table 1), and two Danish out of five regions were not represented at all. Despite differences between primary care in rural and urban areas of Denmark, however, the interviews with GPs located outside the Capital Region (interview no. 3,6,12,17) did not suggest a notable variance in information behaviours from those located in the Capital Region.

### *Conclusion*

In a Danish setting, DHPCs were found not to be very compatible with the GPs' general drug safety information behaviour. We found that this behaviour is a combination of active search in point-of-care situations and a passive attention for clinical management strategies. Further, they generally distrusted DHPCs due to a risk of commercially biased information, they found that numerous sources contained the same information as the DHPCs, and they believed these to be superior in terms of convenience, clinical relevance, and quality.

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### **Conflict of Interest**

None of the authors have any conflicts of interest to report.

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