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RESEARCH ARTICLE



# General practitioners' prescriptions of benzodiazepines, Z-hypnotics and opioid analgesics for elderly patients during direct and indirect contacts. A cross-sectional, observational study

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## ABSTRACT

**Objective:** To describe Norwegian general practitioners' (GPs') prescription patterns of benzodiazepines, Z-hypnotics and opioid analgesics (BZO-drugs) to elderly ( $\geq 70$  years) patients.

**Design, subjects and setting:** Cross sectional, observational study. Contact- and prescription data from 148 Norwegian GPs, issued for elderly patients during eight months in 2008. GP-patient contacts were categorized as *direct contacts* (DC: face-to-face consultations) or *indirect contacts* (IC: via third party, phone or mail). Explanatory variables were characteristics linked to the GPs, patients, and practices. During analyses, GPs' number of listed patients, share of which for elderly patients, and total number of patient consultations during the period (proxy for practice activity), were categorized in quintiles (Q1–5) by number of GPs.

**Main outcome measures:** Number of BZO-drug prescriptions and quantities issued during direct- and indirect GP-patient contacts.

**Results:** In total, 62% of BZO-prescriptions were issued during ICs. Of all prescriptions, 66% were large quantum packages (50 tablets or more), 62% out of which were prescribed during ICs. During the study period, 50% of the patients received repeat prescriptions. Prescribing during ICs was associated with low over all practice activity (Q1) and many (Q5) older patients on the GP's lists.

**Conclusion:** GPs' BZO-drug prescribing to elderly occur more frequently during ICs than within DCs, and are more commonly issued as large quantity packages. This indicates that regular- or long-term use among elderly is common, contrasting with previous and current national guidelines, which recommend regular clinical assessments and short time or intermittent use of BZO-drugs.

## KEY POINTS

- GPs frequently prescribe benzodiazepines, Z-hypnotics and opioid (BZO) drugs for elderly people.
- BZO-drugs are frequently issued during indirect GP-patient contacts and in relatively large quantities, indicating regular or long-term use.
- GPs' BZO-drug prescribing patterns contrast with national guidelines recommending clinical assessment and short time or intermittent use of BZO-drugs.

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## KEYWORDS

General practice; prescriptions; elderly; direct and indirect patient contacts; consultation; hypnotics; anxiolytics; analgesics

## Introduction

Chronic pain, anxiety and sleep disturbances are all frequent health problems among elderly patients, contributing to reduced quality of life. To relieve these ailments, benzodiazepines, Z-hypnotics and opioid analgesics (BZO-drugs) are commonly prescribed. According to previous and present national guidelines, opioid analgesics should be prescribed with caution,

and benzodiazepines and Z-hypnotics should be prescribed at lowest effect-giving doses for short periods or intermittent use [1–3]. Adverse drug effects and reduced therapeutic benefits from regular, long-term use of benzodiazepines and Z-hypnotics are well established [4]. The risk increases considerably for elderly people, resulting in many drug-related falls [5,6] and enhanced risk of cognitive decline and dementia

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[7,8]. Opioid analgesics play a major role in chronic pain treatment in the elderly [9], but as for other BZO-drugs, benefits from long-term opioid treatment for elderly patients are scarcely documented, and should preferably be avoided [3,10]. As a main rule, BZO-drugs should be prescribed during office-consultations [1]. This allows for follow up with clinical assessment to decide the needs for continued treatment, as well as providing patient information on appropriate use, adverse effects, and risk of dependency. Direct doctor–patient contacts (DCs) are therefore essential for both initial and repeated prescribing of BZO-drugs [1,2,11]. The Regular General Practitioner (GP) Scheme in Norway ensures each citizen to be listed to a specific GP, who has the primary health care responsibility of his or her listed patients [12]. GPs are also the major prescribers for their listed patients, including BZO-drug prescribing [11,13], but they often experience drug treatment for elderly patients to be challenging due to multimorbidity and long medication lists [14–16]. In Norway in year 2005, 85% of hypnotics and anxiolytics to patients  $\geq 70$  years were issued by GPs [13,17]. In 2008, 42% of 70–89 year olds received one or more BZO-drug prescriptions, and polypharmacy involving BZO-drugs was common [18]. BZO dosage recommendations as well as duration limitations are often exceeded, and BZO use among elderly is persistently high [13,14,19,20].

A Norwegian study of GPs' prescribing patterns in 1988–1989 shows a strong tendency towards prescribing of psychoactive-drugs during indirect GP-patient contacts (ICs) and this practice increased by patients' increasing age [20,21]. More recent data on GPs BZO-drug prescription patterns are lacking, and there is a knowledge gap regarding the clinical setting for prescribing and the quantities issued as compared to previous and current guidelines.

The aim of our study is to describe Norwegian GPs' prescription patterns of benzodiazepines, Z-hypnotics and opioid analgesics to elderly patients in terms of drug type and amount prescribed, with emphasis on GP-patient prescription contacts (i.e. direct and indirect patient contacts), and to explore variables associated with prescribing during indirect contacts.

## Materials and methods

We included 148 GPs from continual medical education (CME-groups) in southern Norway.

Late 2007, 39 CME-groups including 199 GPs had completed an educational intervention to improve their antibiotic prescribing practice for respiratory tract infections, the first prescription peer academic

**Textbox 1.** Variables included from GPs electronic medical records (EMRs) and from The Norwegian Prescription database (NorPD).

	From the EMR system	From the NorPD
<b>GP and practice variables</b>		
Unique identifier	✓	✓
Year of birth	✓	✓
Gender	✓	✓
GP specialist	✓	✓
Solo/center practice	✓	
City/rural practice	✓	
Number of annual consultations	✓	
Number of listed patients	✓	
Number of listed patients age 70+	✓	
<b>Patient related variables</b>		
Unique patient identifier*	✓	✓
Year of birth	✓	✓
Gender	✓	✓
Date of GP-patient consultation	✓	
Consultation type	✓	
Date of prescription	✓	
Date medication dispensed from pharmacy		✓
Medication ATC code	✓	✓
Medication strength	✓	✓
Medication package size	✓	✓
Medication number of packages	✓	✓

\*Different in the EMR and the NorPD.

detailing (Rx-PAD 1) study [22]. At the same time they had been control group for another intervention, namely on safer prescribing practice for elderly people [23]. In 2008, the GPs in the 39 CME-groups were invited to a second round of the study (Rx-PAD 2), namely to receive the educational intervention they previously had been controls for. Of the 199 GPs, 116 accepted the invitation along with 32 GPs who recently had joined the 39 CME-groups. Thus, 148 GPs were included in the educational Rx-PAD-2 intervention (from late 2008 to late 2009) aiming at improving their prescribing practice for elderly patients. This current study is based on the 148 GPs' baseline data (eight months; January–August 2008) prior to their participation in the Rx-PAD 2 study. The retrospective baseline data were obtained from the GPs' electronic medical records (EMRs) and included consultations with BZO-prescriptions issued to patients  $\geq 70$  years of age. The GPs extracted data from their own EMR system by using software designed by one of the authors (SG). The selection of extracted variables from the EMR systems was primarily tailored for the later educational intervention (Textbox 1).

The GP-patient contacts were categorized as *direct* contacts (DCs: office-consultations or home-visits) or *indirect* contacts (ICs: brief office-visit without consultation with the GP, contact by telephone, mail, or between the doctor and a third party on behalf of the

patient). However, the extracted EMR data were incomplete regarding ICs. To define ICs, the EMR data therefore had to be linked with data from the Norwegian Prescription Database (NorPD; [www.norpd.no](http://www.norpd.no)), containing all BZO-drugs dispensed during the study period. By probabilistic record linkage between the GPs' EMR-data and the NorPD, prescriptions could be attributed to DCs or ICs. The record linkage between the two data sources was based on variables linked to every issued BZO prescription: GP's anonymous identification number, patient's gender and year of birth, date of consultations included in the EMR-data and pharmacy dispensing dates (NorPD-data) (Textbox 1).

The BZO-drug prescriptions found to match with EMR-retrieved prescriptions could be linked to a particular contact, and we categorized prescriptions only found in NorPD, as having been issued during ICs. Among prescriptions only found in NorPD: when more than one prescription to a patient from the same GP was dispensed within one week, we linked these prescriptions to one and the same IC. Drugs dispensed with intervals of more than one week were defined as issued during separate ICs. To control for the robustness of this model, we tested how an expansion of the time window for dispensed drugs (NorPD-data) from one day to either one or two weeks affected the number of ICs. However, this only lead to negligible differences in numbers of estimated ICs within one week, and  $\leq 2\%$  when tested within two weeks timespan.

The prescriptions were categorized into five subgroups: Strong opioids (*morphine, hydromorphone, oxycodone, ketobemidone, pethidine, fentanyl, buprenorphine*), weak opioids (*codeine in combination with paracetamol, tramadol*), anxiolytic benzodiazepines (*clonazepam, diazepam, oxazepam, alprazolam*), hypnotic benzodiazepines (*nitrazepam, flunitrazepam, alprazolam*) and Z-hypnotics (*zopiclone, zolpidem*). Except for strong opioids frequently prescribed for cutaneous application, the included BZO-drug

prescriptions were administered as tablets. All the different drugs were available in small and large packages.

Dispensed drug amounts were categorized as prescribed number of tablets. We defined tablet packages of  $\geq 50$  tablets as *large tablet packages*.

Practice related explanatory variables included in the analyses were: urban or rural practice location, group- or single-handed practice, total patient list number, number of listed patients  $\geq 70$  years, and practice activity. As a proxy for a GP's practice activity, we used his or her total number of DCs during the study period, regardless of patients' age [24]. The patients' age was dichotomized as age 70–79 and  $\geq 80$  years. During analyses, we grouped the following variables into quintiles (Q1–Q5) by numbers of GPs: the GPs' age (years), their total numbers of listed patients, number of listed patients  $\geq 70$  years, and total number of DCs during the baseline period.

Simple descriptive statistics and multilevel logistic regression analyses were applied. The latter to explore factors independently associated with prescribing of benzodiazepines, Z-hypnotics or opioid analgesics for elderly patients during ICs, with GPs as the cluster level. Power calculation was not performed separately for this study, as this had been done for the main outcome measure in the Rx-PAD study [22]. Presented confidence intervals (CIs) are 95% and level of statistical significance was set to 0.05. SPSS version 19 and STATA version 12 were used for the statistical analyses.

## Results

Of the 148 included GPs, 83% were specialist GPs and 93% worked in group practices. More than half of the male and two thirds of the female doctors were working in rural areas (Table 1).

The included GPs had in total 22,119 patients  $\geq 70$  years on their lists. Of these, 9367 patients (42%) had

**Table 1.** Characteristics of included physicians ( $n = 148$ ) and their practices.

	Total ( $n = 148$ )	Male GPs ( $n = 97$ )	Female GPs ( $n = 51$ )*
Age, years, Mean* [95% CI]	50 [48.3–51]	51 [49–52.3]	48 [45.6–49.9]
Specialist GP (%)* [95% CI]	83% [0.8–0.9]	88% [0.8–0.9]	75% [0.6–0.9]
Group Practice (%) [95% CI]	93% [0.9–1.0]	93% [0.9–1.0]	92% [0.9–1.0]
Practice location			
Urban (%) [95% CI]	42% [0.3–0.5]	47% [0.4–0.6]	31% [0.2–0.5]
Patient list size per GP			
Mean* (Range min–max)	1384 (516–3224)	1428 (574–3224)	1301 (516–2492)
Patients $\geq 70$ years on list			
Mean (Range min–max)	150 (10.8% of list) (28–435)	169 (11.5% of list) (37–435)	113 (8.7% of list) (28–271)
Total number of consultations (8 months)			
Mean (Range min–max)	2068 (144–4458)	2141 (144–4458)	1929 (558–3350)

\*All Norwegian GPs, 2008: Mean age: 48.3; Female GPs: 33.7%; Specialist GPs: not available for 2008, 59% in 2004; Mean patient list size: 1190 [30].

received one or more BZO-drug prescriptions during the eight months period, 71% of which were females. There were totally 22,511 contacts for BZO-drug prescribing (DC = 8346 and IC = 14,165) during which

**Table 2.** Prescriptions of benzodiazepines, Z-hypnotics or opioid analgesics for elderly patients during direct (DC) and indirect (IC) GP-patient contacts by physician-, practice- and patient characteristics. Quintiles (Q1–Q5) are by number of GPs.

	Number of BZO-prescriptions for patients ≥70 years	Percentage of prescriptions during ICs [95% CI]
Total Prescribers	N = 28,659	61.9% (n = 17,740) [61.3–62.5]
Male (n = 97)	20,743	61.8% [61.1–62.5]
Female (n = 51)	7916	62.1% [61.0–63.2]
Age Group		
Q*1 (29–42 years)	3879	64.9% [63.3–66.4]
Q2 (43–48 years)	5239	60.9% [59.6–62.2]
Q3 (49–53 years)	6897	59.0% [57.8–60.2]
Q4 (54–56 years)	5251	67.1% [65.8–68.4]
Q5 (57–65 years)	7393	60.1% [59.0–61.2]
Practices		
Single handed practice	2594	60.4% [58.5–62.3]
Group practice (92.6%)	26,065	62.1% [61.5–62.7]
Rural location (58.1%)	15,465	63.1% [62.3–63.9]
Urban location (41.9%)	13,194	60.5% [59.7–61.3]
Number of listed patients, total		
Q1 (516–1081)	4123	66.8% [65.3–68.2]
Q2 (1082–1254)	6498	61.9% [60.7–63.1]
Q3 (1255–1433)	6245	60.6% [59.4–61.8]
Q4 (1434–1608)	4745	62.6% [61.2–64.0]
Q5 (1609–3224)	7048	59.7% [58.5–60.9]
Number of listed patients ≥70		
Q1 (28–78)	2324	61.0% [59.0–63.0]
Q2 (79–122)	4017	62.2% [60.7–63.7]
Q3 (123–159)	5520	61.0% [59.7–62.3]
Q4 (160–212)	7033	61.9% [60.8–63.0]
Q5 (213–435)	9765	62.5% [61.5–63.5]
Total consultations (8 months)		
Q1 (144–1519)	3709	70.4% [68.9–71.9]
Q2 (1520–1900)	5119	63.6% [62.3–64.9]
Q3 (1901–2211)	6102	61.4% [60.2–62.6]
Q4 (2212–2551)	5640	60.6% [59.3–61.9]
Q5 (2552–4458)	8089	58.2% [57.1–59.3]
Patients		
Males (n = 2685)	7534	61.6% [60.5–62.7]
Females (n = 6682)	21,125	62.0% [61.3–62.7]
Age 70–79 years (49.2%)	14,343	58.8% [58.0–59.6]
Age ≥80 years	14,316	65.0% [64.2–65.8]

\*Q denotes quintile.

28,659 BZO-prescriptions were issued and retrieved (Table 2). In all, 62% of the BZO-prescriptions were issued during ICs, and this pattern did not differ between male- and female GPs. The greatest share of IC prescriptions was found for GPs with the lowest number (i.e. Q1) of listed patients or lowest total practice activity. GPs with highest total patient list count (Q5), and largest total number of consultations during the study period were found to have lowest share of BZO-drug prescriptions issued during ICs. Indirect BZO-generating contacts occurred more frequently for patients ≥80 years (65%) than for those in their seventies (59%) (Table 2).

The largest number of prescriptions (n = 9534), were for Z-hypnotics, 7,191 for weak opioids, 6993 for anxiolytic benzodiazepines, 3260 for strong opioids, and 1681 prescriptions were for hypnotic benzodiazepines (Table 3). Large size drug packages of 50 tablets or more amounted to 66% of the total prescription count. 62% of all large packages were issued during ICs. For hypnotic benzodiazepines, 80% of the prescriptions were issued as large packages. For weak opioids and for anxiolytic benzodiazepines, 76% and 74% respectively, of the prescriptions were for large packages, while only 34% of the strong opioid prescriptions were issued as large packages. For all five BZO subgroups, prescribing occurred most frequently during ICs. For both total prescription count and for large packages only, Z-hypnotics were the group most frequently issued, both during ICs and DCs (Table 3).

During the study period, almost half (49%, n = 4559) of the patient population who received BZO drugs, received the prescriptions by ICs only, while 28% (2626) received BZO prescriptions only by DCs. 23% (2182) of the patients received BZO prescriptions during both DCs and ICs. The number of prescription generating contacts for individual patients varied from one to 18. Repeat prescribing (i.e. more than two prescriptions of same drug during the period) was found

**Table 3.** Prescriptions of benzodiazepines (bzd), Z-hypnotics or opioid analgesics for elderly patients during direct and indirect GP-patient contacts by package size issued.

	Number of prescriptions	Direct contact prescriptions (%), [95% CI]	Indirect contact prescriptions (%), [95% CI]
All prescriptions	28,659 (100%)	10,919 (38.1) [37.5–38.7]	17,740 (61.9) [61.3–62.5]
Package ≥ 50 tablets (%) [95% CI]	18,946 (66.1) [65.6–66.7]	7285 (38.5) [37.8–39.1]*	11,661 (61.5) [60.9–62.2]*
Strong opioids, total	3260	888 (27.2) [25.7–28.8]	2372 (72.8) [71.2–74.3]
Package ≥ 50 tablets (%) [95% CI]	1111 (34.1) [32.5–35.7]	253 (22.8) [20.3–25.4]*	858 (77.2) [74.6–79.7]*
Weak opioids, total	7191	2969 (41.3) [40.1–42.4]	4222 (58.7) [57.6–59.9]
Package ≥ 50 tablets (%) [95% CI]	5460 (75.9) [74.9–76.9]	2220 (40.7) [39.4–42.0]*	3240 (59.3) [58.0–60.6]*
Bzd-anxiolytics, total	6993	2911 (41.6) [40.5–42.8]	4082 (58.4) [57.2–59.5]
Package ≥ 50 tablets (%) [95% CI]	5201 (74.4) [73.3–75.4]	2070 (39.8) [38.5–41.1]*	3131 (60.2) [58.9–61.5]*
Bzd-hypnotics, total	1681	663 (39.4) [37.1–41.8]	1018 (60.6) [58.2–62.9]
Package ≥ 50 tablets (%) [95% CI]	1346 (80.1) [78.1–82.0]	582 (43.2) [40.6–45.9]*	764 (56.8) [54.1–59.4]*
Z-hypnotics, total	9534	3488 (36.6) [35.6–37.6]	6046 (63.4) [62.4–64.4]
Package ≥ 50 tablets (%) [95% CI]	5828 (61.1) [60.1–62.1]	2160 (37.1) [35.8–38.3]*	3668 (62.9) [61.7–64.2]*

\*Prescription share of large packages (≥ 50 tablets).



**Table 4.** Multilevel logistic regression analysis showing factors independently associated with prescribing benzodiazepines, Z-hypnotics and opioid analgesics for elderly patients during indirect GP-patient contacts, with GPs as the cluster Level. Dependent variable: 0 = direct contacts ( $n = 8346$ ), 1 = indirect contacts ( $n = 14,165$ ).

	Number of contacts N (%)	Bivariate analysis OR (95% CI)	Multivariate analysis OR (95% CI)
<b>Prescribers</b>			
Female ( $n = 51$ )	6161 (27.4)	1 (reference)	1 (reference)
Male ( $n = 97$ )	16,350 (72.6)	1.0 (0.85–1.29)	1.01 (0.81–1.25)
<b>Age group</b>			
Q*1 (29–42 years)	3050 (13.5)	1 (reference)	1 (reference)
Q2 (43–48 years)	4129 (18.3)	0.89 (0.65–1.22)	1.02 (0.74–1.40)
Q3 (49–53 years)	5336 (23.7)	0.87 (0.64–1.18)	0.95 (0.69–1.31)
Q4 (54–56 years)	4162 (18.5)	1.14 (0.82–1.58)	1.14 (0.82–1.57)
Q5 (57–65 years)	5834 (25.9)	0.97 (0.71–1.32)	0.96 (0.69–1.33)
<b>Practices</b>			
Single handed practice	2031 (8.9)	1 (reference)	1 (reference)
Group Practice	20,878 (91.1)	0.89 (0.61–1.29)	0.92 (0.64–1.32)
Rural location	10,496 (45.8)	1 (reference)	1 (reference)
Urban location	12,413 (54.2)	0.91 (0.75–1.11)	0.97 (0.79–1.18)
<b>Number of listed patients <math>\geq 70</math> years</b>			
Q1 (28–78)	1858 (8.1)	1 (reference)	1 (reference)
Q2 (79–122)	3240 (14.1)	1.06 (0.77–1.45)	1.02 (0.76–1.38)
Q3 (123–159)	4347 (19.0)	1.02 (0.74–1.40)	1.12 (0.80–1.55)
Q4 (160–212)	5569 (24.3)	1.16 (0.85–1.59)	1.26 (0.91–1.74)
Q5 (213–435)	7895 (34.5)	1.28 (0.93–1.75)	1.50 (1.08–2.08)
<b>Total number of office consultations, all patient age groups (8 months)</b>			
Q1 (144–1519)	2929 (12.8)	1 (reference)	1 (reference)
Q2 (1520–1900)	3955 (17.3)	0.75 (0.55–1.02)	0.71 (0.52–0.97)
Q3 (1901–2211)	4930 (21.5)	0.70 (0.52–0.95)	0.65 (0.48–0.89)
Q4 (2212–2551)	4514 (19.7)	0.65 (0.48–0.89)	0.64 (0.47–0.88)
Q5 (2552–4458)	6581 (28.7)	0.60 (0.45–0.82)	0.54 (0.39–0.74)
<b>Patients <math>\geq 70</math> years</b>			
Females	16,784 (73.3)	1 (reference)	1 (reference)
Males	6125 (26.7)	0.97 (0.91–1.03)	0.97 (0.91–1.04)
Age 70–80 years	11,361 (49.6)	1 (reference)	1 (reference)
Age $\geq 80$ years	11,548 (50.4)	1.23 (1.16–1.30)	1.23 (1.16–1.30)

\*Q denotes quintile.

for 50% of the patients, 36% of which did not have any DC during this time.

In the multilevel logistic regression analyses (Table 4), we found a tendency of lower IC-prescribing with increasing practice activity. The lowest share of BZO-prescriptions issued during ICs was associated with high (Q5) practice activity. High share of BZO prescribing during ICs tended to increase successively with GPs' number of listed patients  $\geq 70$  years, but only significant for GPs with the largest number (Q5) of listed elderly patients. Further, BZO-drug prescriptions during ICs were significantly higher for patients  $\geq 80$  years as compared with those aged 70–79 years. Neither prescriber- nor patient gender, prescriber's age, practice location or practice type were factors associated with BZO-drug prescribing during ICs.

## Discussion

### Major findings

GPs prescribed benzodiazepines, Z-hypnotics or opioid analgesics to four out of ten elderly patients. Six out of ten of the BZO-prescriptions were issued without the GP seeing the patient, i.e. during ICs. Furthermore, two thirds of all BZO-prescriptions, irrespective of

contact type, were for relatively large quantum packages. A high share of prescribing without seeing the patient correlated with low number of listed patients, low practice activity, and high number of listed elderly patients.

### Strengths and weaknesses of the study

In Norway, all BZO-drugs are prescription drugs, and all pharmacy-dispensed prescriptions are recorded in the NorPD. This provided access to a total overview of the drugs of interest for this study. The included GPs were comparable to the Norwegian GP population regarding age, gender distribution and patient list size as shown in footnote in Table 1. However, a possible selection bias must be considered as the GPs were all participants of continual medical education groups and most were specialist GPs. Also, most GPs had just participated in an educational intervention study aiming to improve their antibiotic prescribing practice for respiratory tract infections [24]. This may have led to a general increased awareness on overall prescribing. If so, this should have been expected to improve the GPs' prescribing practice in general. We have not found support for this assumption.

We met some limitations since captured data from the GPs EMRs were incomplete with respect to ICs. We therefore had to combine the EMR data with NorPD data to estimate ICs. Our allocation of prescriptions dispensed with intervals of >7 days as separate prescription contacts may have caused a possible misclassification in direction of higher number of ICs. However, because further testing on allocating prescriptions dispensed within one or two-week periods to one contact did only marginally affect the total number of ICs, we regard our results here to be valid.

### ***Findings in relation to other studies***

We have not identified other studies on GPs' prescription practice limited to BZO-drugs for elderly patients. However, comparable general practice studies including all age groups support that repeat prescribing without face-to-face contacts are most frequent for the elderly patients [21,25,26]. In line with our findings, The Norwegian Møre and Romsdal study from 1997 [26], showed that 60% of prescriptions for hypnotic-benzodiazepines were issued during indirect contacts and 53% were for patients  $\geq 65$  years. In a French study of Z-hypnotic prescribing [25], 34% of the prescriptions were issued without face-to-face contacts, and in a study on repeat prescribing from Finland, psychotropic drugs were among those most often repeated without a consultation [26]. Our finding that almost 63% of BZO generating prescription contacts to the elderly were ICs, accounting for 62% of the total prescription numbers, are higher in terms of ICs as compared to the studies from France [25] or Finland [26]. A possible explanation for this may be the relatively older age of our patient population as compared to the others.

Half of the 9367 patients in our study received BZO-drugs solely by ICs. Of the remaining patients, one out of four had drugs ordained during DCs only, and one out of four received BZO-drug prescriptions by both DC and IC. Repeat prescribing of one or more BZO-drugs was found for half of the patients, suggesting that among the elderly, long-term BZO-drug use is common. This result is in line with other studies on hypnotic-, anxiolytic- and analgesic use among elderly people [27,28].

Our study differ from most prescription studies by specifying medication prescribed in small or large package sizes, and not as defined daily doses. In the GPs' everyday clinical work, quick prescription-related assessments will result in a given quantum prescribed. We regarded the GPs' prescription practices more relevant to clinical decision-making when defined as

prescribed number of tablets per ordination, reflecting the duration of use. All drugs of interest for the study were available in small (10, 25 or 30 tablets) and in large packages (50, 98 or 100 tablets). Cut-off for large quantum packages was here set at 50 tablets or more. The finding that large package ordinations made up eight out of ten hypnotic benzodiazepine prescriptions, probably reflect long-term use. However, for analgesics, 50 tablets may not exceed maximum dosage recommendations even for short-term use. Our definition of large quantum prescribing for analgesics may therefore be questioned. Strong opioids was the drug type more commonly prescribed as smaller quantities, in accordance with their more frequent depot dosage formulations.

### ***Meaning and importance of the findings***

The GPs' BZO prescribing for elderly patients conflict with repeated national guidelines because the ordinations most commonly took place during ICs and frequently as large quantum packages. This prescription pattern indicates that BZO-drugs most commonly are prescribed as long-term therapy and not for short-term or intermittent use as recommended [1–3].

### ***Clinical relevance of the findings***

GPs' tendency of prescribing of BZO-drugs to elderly patients during ICs and for long-term use, in spite of national prescription guidelines [1,2], are probably due to complex and individual factors related to both prescribers and patients [29]. GPs' intentions to facilitate drug renewals for old patients with e.g. reduced mobility, may partly explain more prescriptions to be issued during ICs. In Norway, costs for BZO-drugs are generally not reimbursed, and there may be substantial differences in unit pricing of small- and large quantity packages of BZO-drugs. Prescribing larger quantities than recommended may therefore seem cheaper for the patients, however at the same time adding to the patient's risk of drug dependency due to long-term use.

It was somewhat surprising that the GPs with the highest practice activity and largest patient lists had the lowest share of prescribing during ICs. This finding may be explained by higher consultation availability for GPs with more extended overall practice presence. The higher re-imbursement tax for DC vs. IC may also contribute to a higher practice activity.

## Suggestions for further research

In accordance with national guidelines, we claim that doctor-patient contact in ordinary office-consultations or home-visits provide the best frameworks for GPs' BZO-drug prescribing [1–3]. However, other factors of significance for good quality BZO-drug prescribing should be considered (e.g. sufficient patient information, knowledge and awareness of symptoms of drug overuse, side-effects and drug interactions, and initiating BZO-drug discontinuation or -alteration when indicated). This research area should also include qualitative research methods. Qualitative research may provide deeper insights regarding the GP-patient interplay and the underlying reasons for GPs' prescribing practice of BZO-drugs for the elderly.

## Ethical approval

The Rx-PAD study was approved by the Regional Committee for Research Ethics (REK 2009/439/REK SØR ØST A) and by the Norwegian Social Science Data Services (NSD) [1] 05/01171-2/FBB, and 2) 12731 GEH/RH]. This included acceptance to extract the GPs' consultations and prescriptions data. The Norwegian Directorate for Health and Social Affairs had approved exception from health profession secrecy allowing for record linkage between GPs' EMR-data with corresponding data from NorPD.

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## Disclosure statement

The authors report no conflict of interest. The authors take all responsibility for the content and the writing of this paper.

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