RESEARCH ARTICLE

REVISED Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach [version 2; peer review: 3 approved]

Bernhard Langer, Christian Kunow

Department of Health, Nursing, Management, University of Applied Sciences Neubrandenburg, Neubrandenburg, Germany

v2 **First published:** 01 Nov 2019, **8**:1841
https://doi.org/10.12688/f1000research.21045.1
Latest published: 07 May 2020, **8**:1841
https://doi.org/10.12688/f1000research.21045.2

Abstract

Background: In Germany, non-pharmacists (pharmacy technicians and pharmaceutical technical assistants) are permitted to advise on and sell medications in addition to pharmacists. The aim of this study was to determine if pharmacists and non-pharmacists referred patients to a medical consultation for a scenario in which consulting a doctor was mandatory ('appropriate outcome') and what the quality of questioning and – if a medication was dispensed – the quality of information provided were in this context. The study also aimed to determine which factors predicted a necessary referral to a doctor.

Methods: A cross-sectional, covert simulated patient study was conducted in a random sample of community pharmacies stratified by location in the German state of Mecklenburg-Vorpommern. Each pharmacy was visited once by one of four trained investigators. They simulated a symptom-based request involving a grandmother with acute diarrhoea. A multivariate binary logistic regression analysis using potential variables from bivariate analysis was carried out to determine the predictors for a referral to a doctor.

Results: All 199 planned visits were conducted. A necessary referral to a doctor was recommended in 59.8% (n=119) of all visits. The most commonly asked question was 'for whom is the medication?' (75.4%, n=150), while 'clarification by a doctor' was asked the least (17.6%, n=35). In 87.9% (n=175) of all visits a medication was dispensed. Multivariate analysis revealed that, unlike pharmacists, non-pharmacists have a 2.446 times higher likelihood of recommending a referral to a doctor (p = 0.044; 95% CI = 1.025–5.835).

Conclusions: In almost half of the visits a necessary referral to a doctor was not recommended. Furthermore, the quality of questioning and the quality of information were below expectations. Moreover, involvement of nonpharmacists was surprisingly identified as a relevant factor influencing the appropriate outcome.

Keywords

Non-prescription drugs, Community pharmacies, Consultation, Patient simulation, Diarrhoea, Germany

Open Peer Review

Reviewer Status ✓ ✓ ✓

	Invited Reviewers		
	1	**2**	**3**
version 2 (revision) 07 May 2020	✓ report		✓
version 1 01 Nov 2019	? report	✓ report	? report

1 **Mohamed Izham Mohamed Ibrahim**, Qatar University, Doha, Qatar

2 **Suleiman I. Sharif**, University of Sharjah, Sharjah, United Arab Emirates

3 **Subish Palaian**, Ajman University, Ajman, United Arab Emirates

Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Bernhard Langer (langer@hs-nb.de)

Author roles: Langer B: Conceptualization, Data Curation, Formal Analysis, Methodology, Project Administration, Validation, Visualization, Writing – Original Draft Preparation; **Kunow C**: Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: We acknowledge support for the Article Processing Charge from the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation, 414051096) and the Open Access Publication Fund of the Hochschule Neubrandenburg (Neubrandenburg University of Applied Sciences).

How to cite this article: Langer B and Kunow C. **Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach [version 2; peer review: 3 approved]** F1000Research 2020, **8**:1841 https://doi.org/10.12688/f1000research.21045.2

First published: 01 Nov 2019, **8**:1841 https://doi.org/10.12688/f1000research.21045.1

REVISED **Amendments from Version 1**

In response to the reviewers comments and suggestions, we have updated the background, results and conclusions sections in the abstract. We have also revised the introduction, methods, results, discussion and conclusions in the manuscript considering the reviewers comments. In the introduction, the term 'non-pharmacist' was explained more clearly and the difference between the current SP study and the two SP studies on acute diarrhoea that were carried out in 2014 and 2017 was defined more precisely. In the methods section, the scenario used was described in more detail and the ethical statement was expanded to resolve the issue of informed consent. In the results section, the frequencies and percentages for the active substances or active substance groups administered were expanded, all figures were checked to ensure that the percentages are correct and adjustments were made if necessary. The measures required to increase the knowledge base of the pharmacists were added to the discussion. Two additional limitations were also included and discussed. A new paragraph about study recommendations was added, parts of the conclusions were moved to this new paragraph and the conclusion was extensively rewritten. Finally, additional references were added to the bibliography. The grant information was updated to acknowledge support for the Article Processing Charge from Deutsche Forschungsgemeinschaft (DFG, German Research Foundation, 414051096) and the Open Access Publication Fund of the Hochschule Neubrandenburg (Neubrandenburg University of Applied Sciences).

Authors' detailed responses to the reviewers can be found at the end of the article

Introduction

Acute diarrhoea is one of the most common diseases worldwide[1], including in Germany[2]. Worldwide about 1 billion people develop acute diarrhoea each year[2], causing about 2 billion cases of acute diarrhoea[3], and about 30% of the German population suffer from acute diarrhoea episodes each year[2]. Because those affected report becoming ill on average 1.7 times per year[2], this means that about 42 million cases of acute diarrhoea can therefore be expected in Germany.

According to the guidelines of the German Society of General Medicine and Family Medicine, acute diarrhoea is an imbalance between secretion and absorption in the bowels, whereby the symptoms last fewer than 14 days and are associated with an increased frequency (≥ three loose stools in a day) or an increased water content (≥ 75%) or an increased stool weight (≥ 250 g)[4].

Acute diarrhoea may be a result of infections with viruses (for example, noroviruses or rotaviruses), bacteria (for example, non-typhoidal *Salmonella* or diarrheagenic *Escherichia coli*) or parasites (for example, *Cryptosporidium parvum*)[5]. More than 90% of cases result from infections, with viral infections being the most common cause[6]. Bacterial infections, on the other hand, are more often associated with travel, food poisoning and comorbidities. Medications (e.g. antibiotics, cytostatics, diuretics), gastrointestinal disorders (e.g. ulcerative colitis, Crohn's disease), endocrine disorders (e.g. hyperthyroidism, adrenocortical insufficiency) or other medical conditions (e.g. amyloidosis) can also trigger acute diarrhoea[5].

In Germany there is no medical consultation in about two-thirds of cases of acute diarrhoea[2]. Therefore, advice should be provided by community pharmacies (CP), not least because of the wide range of possible causes, when the diarrhoea is self-medicated with over-the-counter (OTC) medications that are only available from CPs in Germany. As part of a high quality consultation, pharmacy staff should also identify when it is necessary to refer a patient to a medical consultation based on symptoms[7,8]. In Germany, non-pharmacists (pharmacy technicians and pharmaceutical technical assistants) are permitted to advise on and sell medications in addition to pharmacists.

Although studies available from Germany regarding the quality of advice provided in CPs reveal significant deficits, analogous to the international literature[9–12], indications other than acute diarrhoea in adults have been investigated in scientific[13,14] and non-scientific studies[15–19]. Because of this lack of studies specifically for acute diarrhoea, the quality of advice provided for acute diarrhoea in adults was analysed for Germany for the first time in 2014 and also identified clear deficiencies[20]. Despite performance feedback used in the process to improve the quality of advice, a follow-up study in 2017 identical to that conducted in 2014 again showed poor quality of advice[21,22]. All the above-mentioned studies have in common that they are based on the simulated patient method (SPM) to determine the quality of advice provided. The SPM is a covert participatory observation by a person who, in an ideal situation, is indistinguishable from a real customer (simulated patient, SP) and visits a CP to simulate a real-life consulting situation based on a previously defined scenario. The data are then collected on the basis of previously defined criteria using an assessment form and the CP is provided with performance feedback, if applicable[23].

Despite the two studies from 2014 and 2017 mentioned above, there remains a lack of information about the quality of advice for the indication acute diarrhoea in Germany. The reason is that the four scenarios investigated in these two studies were designed as 'moderate', in that referral to a medical consultation by the pharmacy staff was not mandatory in any of the scenarios. Both studies also investigated only the quality of advice provided in 21 CPs in a medium-sized northern German city (a total of 84 visits for each study).

The aim of this current study was, therefore, to determine, on the basis of a considerably larger number of CPs, whether pharmacy staff referred patients to a medical consultation for a scenario in which consulting a doctor was mandatory ('appropriate outcome') and what the quality of questioning and – if a medication was dispensed – the quality of information provided were in this context. Factors influencing the 'appropriate outcome' were also determined analogous to other national and international studies[14,21,24–27].

Methods

Design

A cross-sectional study design was chosen in accordance with the 'STROBE Statement – Checklist of items that should be included in reports of cross-sectional studies'[28] and, to determine

the quality of advice provided in the CPs investigated, based on the highly recommended[29] SP method that is often used internationally[23,30–33] as a form of participatory observation[34]. It must once more be explicitly emphasized that this study shares no similarities with the previous studies conducted in 2014 and 2017 apart from the indication investigated (acute diarrhoea).

Setting and participation

Because of time constraints associated with the SPs, the visits took place over winter between 1 November and 15 December 2018 in the German state of Mecklenburg-Vorpommern (31 December 2018: approx. 1.60 million residents; 23,216 km^2 area; low population density of 68.9 residents/km^2)[35]. The Pharmacy Association of Mecklenburg-Vorpommern declined to provide a list of all registered CPs in the state when requested by phone. Consequently, CPs were identified using the pharmacy finder available on the website Apotheken-Umschau.de[36]. All CPs that had a postcode in the state of Mecklenburg-Vorpommern on the reference date of 1 October 2018 using the postcode search of the pharmacy finder were included in the study. These hits were validated with a corresponding Google search. As a result, a basic population of N=396 CPs was determined. A comparison with the last available information from the German Federal Chamber of Pharmacies (ABDA) for the end of 2018 regarding the total number of CPs in Mecklenburg-Vorpommern[37] showed a 99% agreement. The minimum necessary sample size (n) was determined for a population size (N) of 396 and an error margin (e) of 0.05 using the following formula, which is based on a degree of variability of P=0.5 and a 95% confidence interval[38]:

$$n = \frac{N}{1+N(e)^2} = \frac{396}{1+396(0.05)^2} = \frac{396}{1.99} = 198.99$$

In Germany no studies have yet been conducted on a necessary referral to a doctor for acute diarrhoea by CPs. Therefore, the degree of variability is unknown. The assumed degree of variability of P=0.5 maximises the required sample size. The 396 CPs were stratified by location of the CP as an indicator for urban/rural and assigned a random number using the MS Excel random number generator and then simple random sampling was performed in each stratum to select the 199 participating CPs.

Scenario and assessment

The Ordinance on the Operation of CPs in Germany includes an obligation for CPs to introduce a quality management system. The aim is to ensure a preferably adequate advice outcome[39]. To ensure that this can be achieved, the Federal Chamber of Pharmacies has drafted various guidelines and tools, including the tool 'Information and advice as part of self-medication using the example of self-diagnosis of diarrhoea'[40]. This forms the basis of the symptom-based scenario developed (Table 1) and the evaluation form used. The recommendation to consult a doctor by pharmacy staff is defined as the appropriate outcome and the scenario was also designed according to this. The tool provided by the Federal Chamber of Pharmacies indicates 10 possible reasons (such as diarrhoea present > two to three days; fever > 39°C; blood or mucus in the stool; change from diarrhoea to constipation) that, if present, are considered to exceed the limits for self-medication and should result in the recommendation to consult a doctor. For this reason, a scenario was designed in which the grandmother's diarrhoea had already been present for five days and she now had a fever of 40°C. Blood or mucus in the stool as another possible indication that the limits of self medication had been exceeded was not considered in the scenario because it did not seem realistic that a grandmother would share this intimate information with her grandchildren. Therefore, if the pharmacy staff asked the SPs about the presence of blood in the grandmother's stool, the SPs stated that it was not known whether there was blood in the stool.

The evaluation form includes a total of eleven items with the first six items evaluating whether appropriate questions were asked. On this basis, the pharmacy staff should then decide whether to recommend that the patient consult a doctor (item seven). Because the tool also considers 'dispensing a medication in an appropriate quantity up to consulting a doctor' within the discretionary powers of the pharmacy staff, items eight to eleven evaluate whether a medication was dispensed and whether in the process information about the dosage, duration and side effects was provided also for the case of the limits of self-medication being exceeded and the necessary referral to consult a doctor.

Only objective items were used in order to avoid a subjective assessment and thus latitude in the evaluation by the SPs

Table 1. Scenario.

Scenario
The SP enters the CP and asks for a medication for diarrhoea. The SP does not have a particular product in mind.
When questioned by the pharmacy staff, the following information is provided: - Preparation is for the 75-year-old grandmother - Diarrhoea present for five days - Not known how often the symptoms occur - Fever (40°C) since this morning; no vomiting; not known whether blood or mucus in the stool - No medical consultation to date - Existing medical conditions: Diabetes and high blood pressure; not known what medications are taken regularly

(for example, on the friendliness of the pharmacy staff). Therefore, only dichotomous scales were used (closed yes/no questions) to complete the individual items. To avoid the Hawthorne effect[41] and to ensure a realistic consultation situation, the visits took place without first informing the CPs included in the random sample in accordance with other national[20,21] and international[26,42,43] studies.

Data collection

As part of their three-semester research project at the Neubrandenburg University of Applied Sciences, two female and two male Masters students in the Health Sciences faculty, that is, four SPs, were available for the visits. Each CP was visited once (a total of 199 visits), whereby the CPs were distributed randomly across the four SPs (three SPs made 50 visits, one SP made 49 visits).

Before starting the data collection, each of the SPs familiarised themselves with the theoretical principles of the methodology and the contents of the evaluation form.

A pilot study with four visits was then carried out by each of the SPs to train the SPs in the use of the methodology and to verify the functionality of the collection form and the scenario. The total 16 visits were carried out in CPs that were not part of the stratified random sample. No changes to the scenario and the collection form were required after testing the scenarios.

The visits were carried out on different days of the week and at different times of the day. The SPs made their request to the pharmacy staff who first approached them. The SPs only provided additional information if they were then asked by the pharmacy staff to ensure that the information provided is invariable.

Along with the items on the evaluation form, the SPs planned, analogous to the international literature (Table 2), to also collect a number of variables before, during and after the visits that may possibly affect the appropriate outcome.

The corresponding evaluation form was completed immediately after the visits by the SPs to minimise any recall bias in the study results due to faulty memories. After termination of the study, each CP received general written performance feedback.

Data analysis

Data were entered in duplicate into and analysed with SPSS software (IBM, Armonk, NY, USA), version 25 for Windows. As part of the descriptive statistics, frequencies and percentages were determined. Furthermore, 95% confidence intervals (CI) for categorical data using bootstrapping methods were also reported. Because the rule of thumb for sample size assumptions (minimum of 10 events per predictor variable) is given for a logistical regression[45], a binary logistic regression model was developed to identify the influence of various independent variables (Table 2) on the appropriate outcome. All independent variables were checked for outliers and multicollinearity. According to Hosmer *et al.*[46], variables with a P value less than 0.25 in the bivariate analysis were included in the multivariate analysis. Crude odds ratios (COR) and adjusted odds ratios (AOR), 95% confidence intervals (CI) and P values were reported. A P value less than 0.05 was deemed significant in multivariate analysis.

Ethical approval

The study protocol was approved by the institutional ethics committee of the Neubrandenburg University of Applied Sciences (registration number: HSNB/GPM/139/18). According to the 'Guideline for the use of mystery research in market and social research'[47], the data collected were anonymised and recorded in such a way that the CPs involved could not be identified. CPs were not asked for consent prior to the study being conducted because obtaining written consent would have significantly and negatively impacted the results. To resolve

Table 2. Possible influencing factors and time and type of data collection.

Possible influencing factors	Time of data collection	Type of data collection
Location of the CP[14] as indicator for urban/rural	Before the visit because stratification variable	Precise measurement by allocating the number of CPs identified to the particular location
CP quality certificate[24]	After the visit	Precise measurement using a telephone query by the SP after completing the visits
Age of the pharmacy staff[26]	During the visit	Estimate using visual impression of the SP
Gender of the pharmacy staff[26]	During the visit	Exact measurement using visual impression of the SP
Professional group of the pharmacy staff[27]	During and after the visit	Exact measurement based on the name tag, the receipt and, if necessary, using a telephone query by the SP after completing the visit
Queue – patients waiting after the SP[44]	During the visit	Exact measurement using visual impression of the SP
Time of the visit[25]	During the visit	Exact measurement using the SP's watch
Number of questions asked[25]	After the visit	Exact measurement by adding up the individual questions asked

Note: The possible influencing factors are taken from the relevant literature sources.

the issue of informed consent, the authors contacted the CPs by mail and email after the study informing them that an SP study had been conducted with the corresponding background information[48,49]. Recruited students provided their written informed consent to act as SPs.

Results

All 199 planned visits were actually carried out, with a total of €784.70 used from the primary author's own resources. Table 3 shows the socio-demographic data for the 199 CPs and the advising pharmacy staff.

This reveals that the CPs are mostly in locations with competing CPs nearby. In addition, only a minority of the CPs had a quality certificate. In most of the visits, the advising pharmacy staff were female, between 30 and 49 years of age and were non-pharmacists, i.e. pharmacy technicians and pharmaceutical technical assistants.

The appropriate outcome was achieved in 59.8% (n=119) of all visits (Table 4). The question 'for whom is the medication?' was most asked (75.4%, n=150), while 'clarification by a doctor' was asked the least (17.6%, n=35). In 87.9% (n=175)

Table 3. Socio-demographic data for the CPs and the advising pharmacy staff.

	Frequency (n)	Percentage (%)
All CPs	199	100
Location of the CP		
• 1 CP in the location	37	18.6
• 2–4 CPs in the location	58	29.1
• 5–19 CPs in the location	45	22.6
• ≥ 20 CPs in the location	59	29.7
CP quality certificate		
• No	125	62.8
• Yes	52	26.1
• Not able to be determined	22	11.1
Age of the pharmacy staff		
• < 30	39	19.6
• 30–49	110	55.3
• ≥ 50	50	25.1
Gender of the pharmacy staff		
• Male	20	10.1
• Female	179	89.9
Professional group of the pharmacy staff		
• Pharmacist	54	27.1
• Non-pharmacist	90	45.2
• Not able to be determined	55	27.7

Table 4. Assessment items on the evaluation form (n = 199).

	Yes		
	Frequency (n)	Percentage (%)	95% CI
1. For whom is the medication?	150	75.4	69.3–81.4
2. How long have the symptoms been present?	97	48.7	42,2–55.8
3. How often do the symptoms occur?	46	23.1	17.6–29.1
4. Have other symptoms occurred?	56	28.1	22.1–34.7
5. Have the symptoms already been clarified by a doctor?	35	17.6	12.6–23.1
6. Are there other medical conditions or which medications are taken regularly?	65	32.7	26.1–39.2
7. Is a medical consultation recommended (appropriate outcome)?	119	59.8	53.3–66.3
8. Dispensing of a medication	175	87.9	83.4–92.5
9. Information about dosage	155	88.6	83.4–93.1
10. Information about duration	82	46.9	39.4–54.3
11. Information about side effects	14	8.0	4.0–12.6

of all visits a medication was dispensed, whereas in 22.1% (n=24) of all visits no medication was dispensed. Regarding the visits in which a medication was dispensed, in 77.2% (n=135) of visits loperamide was dispensed and in 11.4% (n=20) probiotics were dispensed, whereas, for example, antibiotics that require a prescription in Germany were not dispensed at all. In 88.6% (n=155) information was provided about the dosage of the medication, whereas information about possible side effects was only provided by the pharmacy staff in 8.0% (n=14) of visits.

The binary logistic regression model is shown in Table 5. Bivariate analysis demonstrated that only three (quality certificate, professional group of the pharmacy staff, number of questions asked) of eight predictor variables having a P value < 0.25 were included in a multivariate logistic regression model.

Table 5. Possible factors influencing the recommendation of a necessary medical consultation.

Possible influencing factors and categories	Total n = 199 n (%)	Referral n = 119 n (%)	No referral n = 80 n (%)	COR (95% CI)	P value	AOR (95% CI)	P value
Location of the CP							
• 1 CP in the location	37 (18.6)	24 (20.2)	13 (16.2)	1			
• 2–4 CPs in the location	58 (29.1)	33 (27.7)	25 (31.3)	0.715 (0.305–1.676)	0.440		
• 5–19 CPs in the location	45 (22.6)	27 (22.7)	18 (22.5)	0.813 (0.330–2.000)	0.651		
• ≥ 20 CPs in the location	59 (29.7)	35 (29.4)	24 (30.0)	0.790 (0.337–1.851)	0.587		
CP quality certificate							
• No	125 (62.8)	70 (58.8)	55 (68.8)	1			
• Yes	52 (26.1)	35 (29.4)	17 (21.2)	1.618 (0.821–3.188)	0.165		
• Not able to be determined	22 (11.1)	14 (11.8)	8 (10.0)	1.375 (0.538–3.512)	0.506		
Age of the pharmacy staff							
• < 30	39 (19.6)	21 (17.6)	18 (22.5)	1			
• 30–49	110 (55.3)	66 (55.5)	44 (55.0)	1.286 (0.616–2.684)	0.503		
• ≥ 50	50 (25.1)	32 (26.9)	18 (22.5)	1.524 (0.649–3.580)	0.334		
Gender of the pharmacy staff							
• Male	20 (10.1)	10 (8.4)	10 (12.5)	1			
• Female	179 (89.9)	109 (91.6)	70 (87.5)	1.557 (0.617–3.933)	0.349		
Professional group of the pharmacy staff							
• Pharmacist	54 (27.1)	25 (21.0)	29 (36.3)	1		1	
• Non-pharmacist	90 (45.2)	54 (45.4)	36 (45.0)	1.740 (0.880–3.439)	0.111	2.446 (1.025–5.835)	0.044*
• Not able to be determined	55 (27.7)	40 (33.6)	15 (18.7)	3.093 (1.391–6.877)	0.006	3.269 (1.208–8.843)	0.020*
Time of the visit							
• 8:00 am – 12:00 pm	77 (38.7)	48 (40.3)	29 (36.3)	1			
• 12:01 pm – 4:00 pm	89 (44.7)	49 (41.2)	40 (50.0)	0.740 (0.397–1.379)	0.343		
• 4:01 pm – 8:00 pm	33 (16.6)	22 (18.5)	11 (13.7)	1.208 (0.512–2.850)	0.666		
Queue							
• No	146 (73.4)	86 (72.3)	60 (75.0)	1			
• Yes	53 (26.6)	33 (27.7)	20 (25.0)	1.151 (0.603–2.196)	0.669		
Number of questions asked							
• None	36 (18.1)	7 (5.9)	29 (36.3)	1		1	
• one	39 (19.6)	10 (8.4)	29 (36.3)	1.429 (0.478–4.268)	0.523		
• two	41 (20.6)	32 (26.9)	9 (11.2)	14.730 (4.863–44.616)	< 0.001	15.291 (4.876–47.955)	<0.001*
• ≥ three	83 (41.7)	70 (58.8)	13 (16.2)	22.308 (8.079–61.597)	< 0.001	23.406 (8.204–66.773)	<0.001*

Abbreviations: COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio.

* significant at P < 0.05.

In this multivariate analysis, being a non-pharmacist (AOR = 2.446; 95% CI = 1.025–5.835; p = 0.044) or pharmacy staff with an undetermined professional group (AOR = 3.269; 95% CI = 1.208–8.843; p = 0.020) as opposed to a pharmacist and two (AOR = 15.291; 95% CI = 4.876–47.955; p < 0.001) or three or more (AOR = 23.406; 95% CI = 8.204–66.773; p < 0.001) questions being asked as opposed to no questioning were two factors that were significantly associated with referral to a doctor. The location of the CP, the presence of a quality certificate and a queue, the age and the gender of the pharmacy staff as well as the time of day of the visits did not have any significant effect on the appropriate outcome. The model returned a Nagelkerke R^2 value of 0.45.

Discussion

Although the appropriate outcome, that is, the recommendation to consult a doctor, was achieved in approximately 60% of all visits, approximately 40% of all CPs did not recommend that the patient consult a doctor even though this would have been necessary. Due to the design of the scenario as a symptom-based query, the study results obtained would probably be worse in everyday consultations with its mix of symptom- and product-based queries. This is reflected in the international and national literature in which (otherwise identical) scenarios showed a better quality of advice for a symptom-based query than for a medication-based query[20,50]. In another study a recommendation rate for a necessary medical consultation of 57% was determined for a medication-based query, likewise for acute diarrhoea in adults, in Australian CPs[27]. Considerably worse results for the recommendation of a necessary medical consultation are seen in the international literature for other indications such as pain (recommendation rate: approx. 27%[43]), vaginal thrush (recommendation rates: 10% and 22%[51]) and asthma (recommendation rates: 40% and 19%[52]), which were all medication-based queries. In contrast, the only study that has investigated the recommendation for a necessary medical consultation to date in Germany showed a very high recommendation rate of 90%, again for a medication-based query for an antacid[13].

Possible reasons discussed in the international literature for the poor quality of advice provided include lack of time, manpower, interest and knowledge on behalf of the pharmacy staff[10,50,53,54]. In regards to a lack of knowledge, pharmacists should receive greater training during their studies in patient consultations using examples[44], especially as to date the teaching of such 'soft skills' in German universities has been below average compared to other European countries[55]. In addition, the systematic use of checklists could also help to ensure a better quality of advice in daily patient contact[56].

On the other hand, the international literature reveals that pharmacy staff most definitely have the knowledge to provide good advice, but it is only inadequately applied in actual patient contact[53,57–59]. In a German study, pharmacy staff suggested that this is due to the worry that the client may feel patronised[13]. In contrast to this, another German study determined that most patients would like to have a consultation in the CP; however, the study design meant that rather health-conscious and therefore not representative study participants were included[60]. In a very recent German study, it was stated by pharmacy staff that patients frequently did not want any advice in terms of drug handling, sometimes due to a lack of time[61]. In a somewhat older English study, 62.5% of the patients interviewed did not expect to be asked any questions by the pharmacy staff during their last purchase of a non-prescription medication[62]. Similar results were obtained in a more recent study in Qatar in which the pharmacist cited 'no interest by the patients' as the central reason for providing insufficient advice[42]. Another very recent qualitative study from Australia was also able to determine in this context that from the perspective of both the consumers and the pharmacy staff, the frequent lack of privacy is also an important reason for the poor exchange of information[63]. It would, therefore, be necessary to require CP owners in future to provide appropriate spaces that ensure privacy.

Analogous to other international studies[52,64,65], the number of questions asked had a significant effect on the appropriate outcome. This is based on the rationale that the right decision – in our case to recommend consulting a doctor – can only be made if appropriate questions are asked and thus information is obtained about the patient. In contrast to this, a Saudi Arabian study revealed that there was no relationship between the number of questions asked and the appropriate outcome – in this case, the dispensing of prescription medications without a medical prescription[25]. However, the outcome 'dispensing prescription medications without a medical prescription' is not comparable to the outcome 'recommendation to consult a doctor'. While for the first a sensible decision can be made even without asking appropriate questions (that is, refusing to dispense a prescription medication without a corresponding medical prescription), for the latter a sensible decision is only possible on the basis of appropriately asked questions.

In regards to individual questions, the question about the duration of the acute diarrhoea was asked more frequently compared to similar national studies[20,21]. In a recent SP study, again for acute diarrhoea in adults, that was conducted in Iraq, this question was asked in almost 80% of all visits[66]. In contrast, the results are considerably worse for a comparable Turkish SP study which also investigated the quality of advice provided for acute diarrhoea in adults in which this question was only asked in 26% of all visits[67]. Because certain medications can cause diarrhoea, asking about any pre-existing medical conditions or the patient's medical history is particularly important[68]. This question was asked in this study in approximately one-third of the visits and is thus more frequent than in the comparable national studies[20,21]. In the similar Turkish SP study, this question was not asked in a single visit[67].

Depending on the criteria being investigated, there are also clear differences in the information that is given to the patients when medication is dispensed. Analogous to the national[20,21]

and international literature[57,69], information is often provided about the dosage of the medication but rarely about possible side effects. An active query by patients could help to greatly improve the frequency of advice provided for the criterion 'side effects', as was shown in a recent SP study from Tanzania[70].

Along with the number of questions asked, the professional group of the pharmacy staff providing the advice also had a significant influence on the appropriate outcome. Non pharmacists (pharmaceutical technical assistants and pharmacy technicians) have a significantly higher likelihood of achieving the appropriate outcome than pharmacists. On the other hand, two comparable SP studies from Germany and Australia – also for acute diarrhoea in adults – did not show any significant difference in the quality of advice provided by the two professional groups[21] or a significantly higher likelihood of pharmacists[27] achieving the appropriate outcome. In the Turkish SP study pharmacists made significantly more recommendations to their patients than pharmaceutical technical assistants[67]. For indications other than acute diarrhoea in adults there was an analogous picture – either a significantly better quality of advice provided by pharmacists compared to non-pharmacists[14,65] or no significant differences between the two professional groups[50,57,71]. Due to inconsistent national and international studies and given the surprising results obtained in this study, future studies should investigate in greater depth this influencing factor for the advice provided.

Strengths and limitations

This is the first German study that investigated to what degree CPs recommend a necessary medical consultation for acute diarrhoea in adults. The sample size used in the study (n=199) is also considerably larger than the international median sample size (n=112) for SP studies[72]. An SP study design also avoids social desirability, unlike a survey. By using 4 SPs, the study also satisfies the requirement of not having fewer than 2 (generalisable) but also not too many (standardisable) SPs[72].

Conducting the pilot study with persons other than the researchers may have improved the approach[73], because the perspective of persons not involved in developing the study design would have been considered. On the other hand, carrying out the pilot study also aimed to train the SPs in the use of the methodology, which again would no longer have been possible. By way of qualification, it must be stated that the results only refer to one scenario. In addition, only one indication was investigated. Because the study results only refer to one German state, future studies should be expanded to include additional or all German states. The results also refer only to a quite specific time because the study is a cross-sectional study. There is further need for research to determine whether and, if yes, how the results change over time, which is only possible with a longitudinal study design. Carrying out the visits in winter only may have had a seasonal impact on the findings because the pharmacy staff may possibly have been more aware of this indication due to the increased occurrence of acute diarrhoea in the winter months and therefore the results of our study may have been better than at other times of the year[74]. The audio recordings recommended in the literature for quality assurance[75] must be omitted for data privacy reasons because all CPs would have to be informed about this in advance, which would jeopardise the covert study design. Although the particular evaluation forms were filled out by the SPs immediately after visiting the CPs and only objective evaluation criteria were used, recall bias[26] and the intra- and inter-observer variabilities typical for SP studies[76] cannot be completely ruled out. For greater quality assurance, future SP studies could always carry out and evaluate visits in parallel using two persons (1 SP and 1 observer)[77]. Although in the literature it is recommended for reasons of effectiveness to provide performance feedback to initiate improvement measures immediately after the particular visit[23], this was omitted because the student SPs would probably not be accepted by pharmacy staff as briefing partners[14]. The restrictions on time and resources and the very high number of CPs visited mean that it was also not possible to provide the CPs with individual written performance feedback including benchmarking after the visits.

Study recommendations

The findings of this study recommend further research to identify why the advice provided is so often poor and particularly why the quality of advice provided by pharmacists is so inadequate. The results should make both the Mecklenburg Vorpommern pharmacy association and legislators aware of the need to significantly escalate their quality management efforts. In this context appropriate mandatory continuing education courses as well as regular independent reviews with an adequate sanction mechanism could provide a stimulus to sustainably improve the quality of advice[78,79].

Conclusions

In almost half of the visits a necessary referral to a doctor was not recommended. Furthermore, the quality of questioning and the quality of information were below expectations. Moreover, two or more questions and, surprisingly, the involvement of non pharmacists were identified as relevant factors influencing the appropriate outcome.

Data availability

Underlying data

Harvard Dataverse: Replication Data for: Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach, https://doi.org/10.7910/DVN/5KVLW4[80]

Acknowledgements

The authors thank the four master students for acting as simulated patients.

References

1. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators: **Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017.** *Lancet.* 2018; **392**(10159): 1789–1858.
PubMed Abstract | Publisher Full Text | Free Full Text

2. Lankisch PG, Mahlke R, Lübbers H, *et al.*: **Zertifizierte medizinische Fortbildung: Leitsymptom Diarrhö.** *Dtsch Arztebl.* 2006; **103**(5): A261–A269.
Reference Source

3. Farthing M, Salam MA, Lindberg G, *et al.*: **Acute diarrhea in adults and children: a global perspective.** *J Clin Gastroenterol.* 2013; **47**(1): 12–20.
PubMed Abstract | Publisher Full Text

4. Sander M, Gerlach K: **S1-Leitlinie Akuter Durchfall.** Deutsche Gesellschaft für Allgemeinmedizin und Familienmedizin. AWMF-Registernr. 053/030. Stand der Revision: 09/2013. *Gültig bis* 09/2018; (accessed 04 May 2019).
Reference Source

5. Barr W, Smith A: **Acute diarrhea.** *Am Fam Physician.* 2014; **89**(3): 180–189.
PubMed Abstract

6. Hong KS, Kim JS: **Rifaximin for the treatment of acute infectious diarrhea.** *Therap Adv Gastroenterol.* 2011; **4**(4): 227–235.
PubMed Abstract | Publisher Full Text | Free Full Text

7. Ruiz ME: **Risks of self-medication practices.** *Curr Drug Saf.* 2010; **5**(4): 315–323.
PubMed Abstract | Publisher Full Text

8. Bennadi D: **Self-medication: A current challenge.** *J Basic Clin Pharm.* 2013; **5**(1): 19–23.
PubMed Abstract | Publisher Full Text | Free Full Text

9. Molloy P, Chambers R, Cork T: **How well are national guidelines relating to the general sales of aspirin and paracetamol, adhered to by retail stores: a mystery shopper study.** *BMJ Open.* 2016; **6**(1): e010081.
PubMed Abstract | Publisher Full Text | Free Full Text

10. Ayele AA, Mekuria AB, Tegegn HG, *et al.*: **Management of minor ailments in a community pharmacy setting: Findings from simulated visits and qualitative study in Gondar town, Ethiopia.** *PLoS One.* 2018; **13**(1): e0190583.
PubMed Abstract | Publisher Full Text | Free Full Text

11. Ibrahim MIM, Awaisu A, Palaian S, *et al.*: **Do community pharmacists in Qatar manage acute respiratory conditions rationally? A simulated client study.** *J Pharm Health Serv Res.* 2018; **9**(1): 33–39.
Publisher Full Text

12. Murphy AL, Gardner DM: **A simulated patient evaluation of pharmacist's performance in a men's mental health program.** *BMC Res Notes.* 2018; **11**(1): 765.
PubMed Abstract | Publisher Full Text | Free Full Text

13. Berger K, Eickhoff C, Schulz M: **Counselling quality in community pharmacies: implementation of the pseudo customer methodology in Germany.** *J Clin Pharm Ther.* 2005; **30**(1): 45–57.
PubMed Abstract | Publisher Full Text

14. Alte D, Weitschies W, Ritter CA: **Evaluation of consultation in community pharmacies with mystery shoppers.** *Ann Pharmacother.* 2007; **41**(6): 1023–1030.
PubMed Abstract | Publisher Full Text

15. Stiftung Warentest: **Mehr schlecht als recht.** *test.* 2004; (3): 91–100.

16. Stiftung Warentest: **Falsch beraten.** *test.* 2008; (7): 84–89.

17. Stiftung Warentest: **Bittere Pillen.** *test.* 2010; (5): 80–91.

18. Stiftung Warentest: **Mit Risiken und Nebenwirkungen.** *test.* 2014; (5): 88–97.

19. DtGV - Deutsche Gesellschaft für Verbraucherstudien mbH:**Apothekenstudie 2012: Audit Servicequalität 09/2012.** *Berlin.* DtGV; 2012; (accessed 30 September 2018).
Reference Source

20. Langer B, Bull E, Burgsthaler T, *et al.*: **Assessment of counselling for acute diarrhoea in German pharmacies: a simulated patient study.** *Int J Pharm Pract.* 2018; **26**(4): 310–317.
PubMed Abstract | Publisher Full Text | Free Full Text

21. Langer B, Kieper M, Laube S, *et al.*: **Assessment of counselling for acute diarrhoea in North-Eastern German pharmacies – A follow-up study using the simulated patient methodology.** *Pharmacol Pharm.* 2018; **9**(7): 257–269.
Publisher Full Text

22. Langer B, Kunow C: **Medication dispensing, additional therapeutic recommendations, and pricing practices for acute diarrhoea by community pharmacies in Germany: a simulated patient study.** *Pharm Pract (Granada).* 2019; **17**(3): 1579.
PubMed Abstract | Publisher Full Text | Free Full Text

23. Xu T, de Almeida Neto AC, Moles RJ: **A systematic review of simulated-patient methods used in community pharmacy to assess the provision of non-prescription medicines.** *Int J Pharm Pract.* 2012; **20**(5): 307–319.
PubMed Abstract | Publisher Full Text

24. Kippist C, Wong K, Bartlett D, *et al.*: **How do pharmacists respond to complaints of acute insomnia? A simulated patient study.** *Int J Clin Pharm.* 2011; **33**(2): 237–245.
PubMed Abstract | Publisher Full Text

25. Kashour TS, Joury A, Alotaibi AM: **Quality of assessment and counselling offered by community pharmacists and medication sale without prescription to patients presenting with acute cardiac symptoms: a simulated client study.** *Eur J Clin Pharmacol.* 2016; **72**(3): 321–328.
PubMed Abstract | Publisher Full Text

26. Saba M, Diep J, Bittoun R, *et al.*: **Provision of smoking cessation services in Australian community pharmacies: a simulated patient study.** *Int J Clin Pharm.* 2014; **36**(3): 604–614.
PubMed Abstract | Publisher Full Text

27. Collins JC, Schneider CR, Faraj R, *et al.*: **Management of common ailments requiring referral in the pharmacy: a mystery shopping intervention study.** *Int J Clin Pharm.* 2017; **39**(4): 697–703.
PubMed Abstract | Publisher Full Text

28. **STROBE Statement – Checklist of items that should be included in reports of cross-sectional studies**. (accessed 08 February 2019).
Reference Source

29. Caamaño F, Ruano A, Figueiras A, *et al.*: **Data collection methods for analyzing the quality of the dispensing in pharmacies.** *Pharm World Sci.* 2002; **24**(6): 217–223.
PubMed Abstract | Publisher Full Text

30. Björnsdottir I, Granas AG, Bradley A, *et al.*: **A systematic review of the use of simulated patient methodology in pharmacy practice research from 2006 to 2016.** *Int J Pharm Pract.* 2019.
PubMed Abstract | Publisher Full Text

31. Puspitasari HP, Aslani P, Krass I: **A review of counseling practices on prescription medicines in community pharmacies.** *Res Social Adm Pharm.* 2009; **5**(3): 197–210.
PubMed Abstract | Publisher Full Text

32. Mesquita AR, Lyra DP Jr, Brito GC, *et al.*: **Developing communication skills in pharmacy: a systematic review of the use of simulated patient methods.** *Patient Educ Couns.* 2010; **78**(2): 143–148.
PubMed Abstract | Publisher Full Text

33. van Eikenhorst L, Salema NE, Anderson C: **A systematic review in select countries of the role of the pharmacist in consultations and sales of non-prescription medicines in community pharmacy.** *Res Social Adm Pharm.* 2017; **13**(1): 17–38.
PubMed Abstract | Publisher Full Text

34. Bruhn M: **Qualitätsmanagement für Dienstleistungen.** *Handbuch für ein erfolgreiches Qualitätsmanagement. Grundlagen – Konzepte – Methoden.* 10th edn. Berlin et al.: Springer; 2016.
Publisher Full Text

35. Statistisches Amt Mecklenburg-Vorpommern: **Statistisches Jahrbuch Mecklenburg-Vorpommern 2018.** 2018; (accessed 10 June 2020).
Reference Source

36. Apotheken Umschau: **Apothekenfinder.** 2018; (accessed 13 September 2018).
Reference Source

37. **ABDA – Bundesvereinigung Deutscher Apothekerverbände.** *Die Apotheke – Zahlen, Daten, Fakten 2019.* Berlin: ABDA; 2019; (accessed 10 June 2019).
Reference Source

38. Israel GD: **Determining sample size.** University of Florida; 2012; (accessed 04 September 2018).
Reference Source

39. **Apothekenbetriebsordnung in der Fassung der Bekanntmachung vom 26. September 1995 (BGBl. I S. 1195), die zuletzt durch Artikel 2 der Verordnung vom 2. Juli 2018 (BGBl. I S. 1080) geändert worden ist.** [Ordinance on the operation of community pharmacies in the version published on 26 September 1995 (German Social Code p. 1195), last amended by Article 2 of the Ordinance dated 2 July 2018 (German Social Code p. 1080), (accessed 22 September 2018).
Reference Source

40. **BAK – Bundesapothekerkammer. Arbeitshilfe der Bundesapothekerkammer zur Qualitätssicherung, Information und Beratung im Rahmen der Selbstmedikation am Beispiel der Eigendiagnose Durchfall – Anwendungsbeispiel zu den Leitlinien, Stand der Revision: 13.11.2013.** [German Federal Chamber of Pharmacies. Guidelines from the Federal Chamber of Pharmacies for quality assurance, information and advice as part of self-medication using the example of self-diagnosis of diarrhoea – usage example for the guidelines, date of revision 13.11.2013]. Berlin: BAK; 2013; (accessed 04 September 2018).
Reference Source

41. McCambridge J, Witton J, Elbourne DR: **Systematic review of the Hawthorne effect: new concepts are needed to study research participation effects.** *J Clin Epidemiol.* 2014; **67**(3): 267–277.
PubMed Abstract | Publisher Full Text | Free Full Text

42. Paravattil B, Kheir N, Yousif A: **Utilization of simulated patients to assess diabetes and asthma counseling practices among community pharmacists in Qatar.** *Int J Clin Pharm.* 2017; **39**(4): 759–768.
PubMed Abstract | Publisher Full Text

43. Byrne GA, Wood PJ, Spark MJ: **Non-prescription supply of combination analgesics containing codeine in community pharmacy: A simulated patient study.** *Res Social Adm Pharm.* 2018; **14**(1): 96–105.
PubMed Abstract | Publisher Full Text

44. Langer B, Bull E, Burgsthaler T, *et al.*: **[Using the simulated patient methodology to assess counselling for acute diarrhoea - evidence from Germany]**. *Z Evid*

Fortbild Qual Gesundhwes. 2016; **112**: 19–26.
PubMed Abstract | Publisher Full Text

45. Peduzzi P, Concato J, Kemper E, *et al.*: **A simulation study of the number of events per variable in logistic regression analysis.** *J Clin Epidemiol.* 1996; **49**(12): 1373–1379.
PubMed Abstract | Publisher Full Text

46. Hosmer D, Lemeshow L, Sturdivant R: **Applied Logistic Regression**. 10th edn. Hoboken: Wiley; 2013.
Publisher Full Text

47. **BVM – Berufsverband Deutscher Markt- und Sozialforscher e.V. Richtlinie für den Einsatz von Mystery Research in der Markt- und Sozialforschung.** 2006; (accessed 04 September 2018).
Reference Source

48. Fitzpatrick A, Tumlinson K: **Strategies for Optimal Implementation of Simulated Clients for Measuring Quality of Care in Low- and Middle-Income Countries.** *Glob Health Sci Pract.* 2017; **5**(1): 108–114.
PubMed Abstract | Publisher Full Text | Free Full Text

49. Mohamed Ibrahim MI: **Peer Review Report For: Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach [version 1; peer review: 1 approved, 2 approved with reservations].** *F1000Res.* 2019; **8**: 1841.
Publisher Full Text

50. Horvat N, Koder M, Kos M: **Using the simulated patient methodology to assess paracetamol-related counselling for headache.** *PLoS One.* 2012; **7**(12): e52510.
PubMed Abstract | Publisher Full Text | Free Full Text

51. Schneider CR, Emery L, Brostek R, *et al.*: **Evaluation of the supply of antifungal medication for the treatment of vaginal thrush in the community pharmacy setting: a randomized controlled trial.** *Pharm Pract (Granada).* 2013; **11**(3): 132–137.
PubMed Abstract | Publisher Full Text | Free Full Text

52. Schneider CR, Everett AW, Geelhoed E, *et al.*: **Intern pharmacists as change agents to improve the practice of nonprescription medication supply: Provision of salbutamol to patients with asthma.** *Ann Pharmacother.* 2010; **44**(7–8): 1319–1326.
PubMed Abstract | Publisher Full Text

53. Surur AS, Getachew E, Teressa E, *et al.*: **Self-reported and actual involvement of community pharmacists in patient counseling: a cross-sectional and simulated patient study in Gondar, Ethiopia.** *Pharm Pract (Granada).* 2017; **15**(1): 890.
PubMed Abstract | Publisher Full Text | Free Full Text

54. Ayalew M: **Medication Counseling Practice in Ethiopia: A Systematic Review.** *J Basic Clin Pharma.* 2017; **8**: S001–S005.
Reference Source

55. Atkinson J: **Heterogeneity of pharmacy education in Europe.** *Pharmacy (Basel).* 2014; **2**(3): 231–243.
Publisher Full Text

56. Chong WW, Aslani P, Chen TF: **Adherence to antidepressant medications: an evaluation of community pharmacists' counseling practices.** *Patient Prefer Adherence.* 2013; **7**: 813–825.
PubMed Abstract | Publisher Full Text | Free Full Text

57. Gokcekus L, Toklu HZ, Demirdamar R, *et al.*: **Dispensing practice in the community pharmacies in the Turkish Republic of Northern Cyprus.** *Int J Clin Pharm.* 2012; **34**(2): 312–324.
PubMed Abstract | Publisher Full Text

58. Ogbo PU, Aina BA, Aderemi-Williams RI: **Management of acute diarrhea in children by community pharmacists in Lagos, Nigeria.** *Pharm Pract (Granada).* 2014; **12**(1): 376.
PubMed Abstract | Publisher Full Text | Free Full Text

59. Brata C, Marjadi B, Schneider CR, *et al.*: **Information-gathering for self-medication via Eastern Indonesian community pharmacies: a cross-sectional study.** *BMC Health Serv Res.* 2015; **15**: 8.
PubMed Abstract | Publisher Full Text | Free Full Text

60. Anwand T, Schaefer M: **Umfrage. Individuelle Beratung statt kommentarloser Abgabe.** *Pharm Ztg.* 2002; **147**: 114–116.
Reference Source

61. Schumacher PM, Neininger MP, Kaune A, *et al.*: **Counseling patients on correct drug handling in German community pharmacies: experiences and opinions of pharmaceutical staff.** *Int J Clin Pharm.* 2019; **41**(1): 151–158.
PubMed Abstract | Publisher Full Text

62. Morris CJ, Cantrill JA, Weiss MC: **"One simple question should be enough": consumers' perceptions of pharmacy protocols.** *Int J Pharm Pract.* 1997; **5**(2): 64–71.
Publisher Full Text

63. Seubert LJ, Whitelaw K, Boeni F, *et al.*: **Barriers and Facilitators for Information Exchange during Over-The-Counter Consultations in Community Pharmacy: A Focus Group Study.** *Pharmacy (Basel).* 2017; **5**(4): 65.
PubMed Abstract | Publisher Full Text | Free Full Text

64. Collins JC, Schneider CR, Naughtin CL, *et al.*: **Mystery shopping and coaching as a form of audit and feedback to improve community pharmacy management of non-prescription medicine requests: an intervention study.** *BMJ Open.* 2017; **7**(12): e019462.
PubMed Abstract | Publisher Full Text | Free Full Text

65. Watson MC, Bond CM, Grimshaw J, *et al.*: **Factors predicting the guideline compliant supply (or non-supply) of non-prescription medicines in the community pharmacy setting.** *Qual Saf Health Care.* 2006; **15**(1): 53–57.
PubMed Abstract | Publisher Full Text | Free Full Text

66. Ibrahim IR, Palaian S, Ibrahim MI: **Assessment of diarrhea treatment and counseling in community pharmacies in Baghdad, Iraq: A simulated patient study.** *Pharm Pract (Granada).* 2018; **16**(4): 1313.
PubMed Abstract | Publisher Full Text | Free Full Text

67. Sancar M, Tezcan E, Okuyan B, *et al.*: **Assessment of the Attitude of Community Pharmacists and Pharmacy Technicians towards Diarrhea: A Simulated Patient Study in Turkey.** *Trop J Pharm Res.* 2015; **14**(8): 1509–1515.
Publisher Full Text

68. Abraham B, Sellin JH: **Drug-induced diarrhea.** *Curr Gastroenterol Rep.* 2007; **9**(5): 365–372.
PubMed Abstract | Publisher Full Text

69. Ibrahim MI, Palaian S, Al-Sulaiti F, *et al.*: **Evaluating community pharmacy practice in Qatar using simulated patient method:acute gastroenteritis management.** *Pharm Pract (Granada).* 2016; **14**(4): 800.
PubMed Abstract | Publisher Full Text | Free Full Text

70. Horumpende PG, Sonda TB, van Zwetselaar M, *et al.*: **Prescription and non-prescription antibiotic dispensing practices in part I and part II pharmacies in Moshi Municipality, Kilimanjaro Region in Tanzania: A simulated clients approach.** *PLoS One.* 2018; **13**(11): e0207465.
PubMed Abstract | Publisher Full Text | Free Full Text

71. Kayshap KC, Nissen LM, Smith SS, *et al.*: **Management of over-the-counter insomnia complaints in Australian community pharmacies: a standardised patient study.** *Int J Pharm Pract.* 2014; **22**(2): 125–134.
PubMed Abstract | Publisher Full Text

72. Watson MC, Norris P, Granas AG: **A systematic review of the use of simulated patients and pharmacy practice research.** *Int J Pharm Pract.* 2006; **14**(2): 83–93.
Publisher Full Text

73. Sharif SI: **Peer Review Report For: Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach [version 1; peer review: 1 approved, 2 approved with reservations].** *F1000Res.* 2019; **8**: 1841.
Publisher Full Text

74. Palaian S: **Peer Review Report For: Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach [version 1; peer review: 1 approved, 2 approved with reservations].** *F1000Res.* 2019; **8**: 1841.
Publisher Full Text

75. Werner JB, Benrimoj SI: **Audio taping simulated patient encounters in community pharmacy to enhance the reliability of assessments.** *Am J Pharm Educ.* 2008; **72**(6): 136.
PubMed Abstract | Publisher Full Text | Free Full Text

76. Bardage C, Westerlund T, Barzi S, *et al.*: **Non-prescription medicines for pain and fever--A comparison of recommendations and counseling from staff in pharmacy and general sales stores.** *Health Policy.* 2013; **110**(1): 76–83.
PubMed Abstract | Publisher Full Text

77. Mahmoud AA, Althobaiti OA, Althobaiti AE, *et al.*: **Community pharmacists' response to acute back pain: A simulated patient study in western region, Saudi Arabia.** *GSC Biological and Pharmaceutical Sciences.* 2018; **2**(2): 25–32.
Publisher Full Text

78. Chowdhury F, Sturm-Ramirez K, Mamun AA, *et al.*: **Effectiveness of an educational intervention to improve antibiotic dispensing practices for acute respiratory illness among drug sellers in pharmacies, a pilot study in Bangladesh.** *BMC Health Serv Res.* 2018; **18**(1): 676.
PubMed Abstract | Publisher Full Text | Free Full Text

79. Edalat A: **Pro und Kontra: Pflichtfortbildung für Apotheker? DAZ.ONLINE vom 12.07.2018**. (accessed 22 September 2018).
Reference Source

80. Langer B, Kunow C: **"Replication Data for: Do north-eastern German pharmacies recommend a necessary medical consultation for acute diarrhoea? Magnitude and determinants using a simulated patient approach."** 2019. Harvard Dataverse, V2, UNF: 6:ThCfNrfKdA/eRzJFf1L7yQ== [fileUNF].
http://www.doi.org/10.7910/DVN/5KVLW4

Open Peer Review

Current Peer Review Status: ✔ ✔ ✔

Version 2

Reviewer Report 09 June 2020

https://doi.org/10.5256/f1000research.26136.r63148

✔ **Subish Palaian**
Department of Clinical Sciences, College of Pharmacy and Health Sciences, Ajman University, Ajman, United Arab Emirates

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 21 May 2020

https://doi.org/10.5256/f1000research.26136.r63149

✔ **Mohamed Izham Mohamed Ibrahim**
Department of Clinical Pharmacy and Practice, College of Pharmacy, Qatar University, Doha, Qatar

I have reviewed the responses and changes made in the revised manuscript. I am satisfied with the improvement. With the present quality, I approve this manuscript for indexing.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 11 February 2020

https://doi.org/10.5256/f1000research.23162.r58282

?

Subish Palaian
Department of Clinical Sciences, College of Pharmacy and Health Sciences, Ajman University, Ajman, United Arab Emirates

I enjoyed reading the manuscript. It is a well conducted study with robust methodology and focusing on 'community pharmacist referral' which is an important aspect of community pharmacy practice. I thank the F1000Research for providing me the opportunity in reviewing this manuscript. The 'simulated client method' used in this research is suitable in evaluating the real-life practice happening at the community pharmacies.

I have few concerns associated with the manuscript and are as below:

Abstract:

- The result section of the abstract mentions about 'non-pharmacist'. It would be nice to elaborate more on those non-pharmacists somewhere in the Introduction section. Though it is mentioned in the Results, para 2, one would like to know whether non-pharmacists are allowed to dispense medications. This may be useful for international readers. Similarly, in the result part the statement 'two or more questions as opposed to no questions were
significantly associated with a referral to a doctor' doesn't appear to be novel. It is understood that someone who had not asked any question will be unable to refer. Authors might consider other observations to be mentioned at this section of the abstract.

Introduction:

- The paragraph 6, authors need to clearly mention which 'baseline' and 'follow-up' study are they mentioning. What is the relation between the current study and those previous studies. Are they the same sample?

- I also found some similarity with few of the previous publications by the author using the same 'acute diarrhea' scenario. Authors need to verify the contents and avoid any similarities.

- May be the Introduction section should elaborate more on the justification of this research. Why did all these studies used only 'acute diarrhea' as the scenario? This needs further elaboration.

Methodology

- Under scenario and assessment, it is not clear how authors categorized 'Diarrhoea being present for five days as well as a high fever (40°C) are both considered to exceed the limits of self-medication'. I suppose even if there is presence of mucus and/or blood in the stool may be

considered referral. I suggest more explanation on development of the scenario and content validation and why 'Dysentery' was excluded from the scenario.

Results:

- In this research, 45.2% of the dispensers were 'non-pharmacists'. If that is the case then how can we correlate the research findings to evaluate the Community Pharmacy practice? The term 'non-pharmacist' needs more elaboration. Probably in the Introduction section, as I mentioned elsewhere.

- Table 4, response 8. Dispensing of a medication 175 (87.9%). What were these medications. Were there any antibiotics? What happened to the rest 22.1%? Why they did not dispense medications? These are some missing information and needs to be incorporated in the Results section.

Discussion:

- The discussion can focus on reason for non-referral by the pharmacists. Are there skills related issues? Do the pharmacists possess adequate skills in assessing patients with diarrhea? These aspects may further enrich the discussion.

Limitations:

- Authors could explore any seasonal impact on the finding.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Pharmacy Practice, Pharmacovigilance, Pharmacoepidemiology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 24 Apr 2020

Bernhard Langer, University of Applied Sciences Neubrandenburg, Neubrandenburg, Germany

We would like to thank the reviewer for taking the time to review our manuscript and also for the very helpful and detailed comments, recommendations and questions. See our point-by-point response to the reviewer's comments below.

I enjoyed reading the manuscript. It is a well conducted study with robust methodology and focusing on 'community pharmacist referral' which is an important aspect of community pharmacy practice. I thank the F1000Research for providing me the opportunity in reviewing this manuscript. The 'simulated client method' used in this research is suitable in evaluating the real-life practice happening at the community pharmacies.

I have few concerns associated with the manuscript and are as below:

Abstract:

- The result section of the abstract mentions about 'non-pharmacist'. It would be nice to elaborate more on those non-pharmacists somewhere in the Introduction section. Though it is mentioned in the Results, para 2, one would like to know whether non-pharmacists are allowed to dispense medications. This may be useful for international readers.

Thank you for this comment. The following sentence has been added to the background section of the abstract: 'In Germany, non-pharmacists (pharmacy technicians and pharmaceutical technical assistants) are permitted to advise on and sell medications in addition to pharmacists.'

- Similarly, in the result part the statement
'two or more questions as opposed to no questions were
significantly associated with a referral to a doctor' doesn't appear to be novel. It is understood that someone who had not asked any question will be unable to refer. Authors might consider other observations to be mentioned at this section of the abstract.

**Thank you for this comment. We replaced the statement
'two or more questions as opposed to no questions were
significantly associated with a referral to a doctor' with other observations.**

Introduction:

- The paragraph 6, authors need to clearly mention which 'baseline' and 'follow-up' study are they mentioning. What is the relation between the current study and those previous studies. Are they the same sample?

Thank you for this comment. We expressed ourselves misleadingly.To clarify, the sentence has been restructured as follows: 'Despite the two studies from 2014 and 2017 mentioned above, there remains a lack of information about the quality of advice for the indication acute diarrhoea in Germany. The reason is that the four scenarios investigated in these two studies were designed as 'moderate', in that referral to a medical consultation by the pharmacy staff was not mandatory in any of the scenarios.' Also to clarify, the word 'current' has been added to this sentence: 'The aim of this current study

was, therefore, to determine on the basis of a considerably larger number of pharmacies whether the pharmacy staff referred patients to a medical consultation for a scenario in which consulting a doctor was mandatory ('appropriate outcome') and what the quality of questioning and – if a medication was dispensed – the quality of information provided were in this context.' The following sentence was also added to the design subsection in the methods section: 'It must once more be explicitly emphasized that this study shares no similarities with the previous studies conducted in 2014 and 2017 apart from the indication investigated (acute diarrhoea).'

- I also found some similarity with few of the previous publications by the author using the same 'acute diarrhea' scenario. Authors need to verify the contents and avoid any similarities.

Thank you for this comment. This study and the previous studies investigate the same indication (acute diarrhoea) but do not use the same scenario. As described in the introduction section, the scenarios used in previous studies from 2014 and 2017 were designed as 'moderate' in that in none of the scenarios was a referral for medical consultation by the pharmacy staff mandatory. In contrast, this study determines whether the pharmacy staff referred patients to a medical consultation in a scenario in which consulting a doctor was mandatory. Therefore, it is simulated – unlike the studies from 2014 and 2017 – that the grandmother has had diarrhoea for five days and fever (40°C) (see Table 1). To clarify, the following sentence has been added to the design subsection in the methods section: 'It must once more be explicitly emphasized that this study shares no similarities with the previous studies conducted in 2014 and 2017 apart from the indication investigated (acute diarrhoea).'

- May be the Introduction section should elaborate more on the justification of this research. Why did all these studies used only 'acute diarrhea' as the scenario? This needs further elaboration.

Thank you for this comment. As mentioned in the introduction section, there are studies available from Germany regarding the quality of advice provided in pharmacies but none for this indication. To better clarify why three research studies for acute diarrhoea are necessary, the sentences have been restructured as follows: 'Because of this lack of studies for acute diarrhoea, the quality of advice provided for acute diarrhoea in adults was analysed for Germany for the first time in 2014 and also identified clear deficiencies. Despite performance feedback used in the process to improve the quality of advice, a follow-up study in 2017 identical to that conducted in 2014 again showed poor quality of advice.' And furthermore: 'Despite the two studies from 2014 and 2017 mentioned above, there remains a lack of information about the quality of advice for the indication acute diarrhoea in Germany. The reason is that the four scenarios investigated in these two studies were designed as "moderate", in that referral to a medical consultation by the pharmacy staff was not mandatory in any of the scenarios.'

Methodology

- Under scenario and assessment, it is not clear how authors categorized 'Diarrhoea being present for five days as well as a high fever (40°C) are both considered to exceed the limits of self-medication'. I suppose even if there is presence of mucus and/or blood in the stool

may be considered referral. I suggest more explanation on development of the scenario and content validation and why 'Dysentery' was excluded from the scenario.

Thank you for this comment. More explanation on development of the scenario and content validation has been given. Additionally, it has been explained why 'Dysentery' was excluded from the scenario. Therefore, the relevant sentences have been restructured as follows: 'The tool provided by the Federal Chamber of Pharmacies indicates 10 possible reasons (such as diarrhoea present > two to three days; fever > 39°C; blood or mucus in the stool; change from diarrhoea to constipation) each of which, if present, are considered to exceed the limits for self-medication and should result in the recommendation to consult a doctor. For this reason, a scenario was designed in which the grandmother's diarrhoea had already been present for five days and she also had a fever of 40°C. Blood or mucus in the stool as another possible indication that the limits of self-medication had been exceeded was not considered in the scenario because it did not appear realistic for a grandmother to share this intimate information with her grandchildren. Therefore, if the pharmacy staff asked the SPs about the presence of blood in the grandmother's stool, the SPs stated that it was not known whether there was blood in the stool.'

Results:

- In this research, 45.2% of the dispensers were 'non-pharmacists'. If that is the case then how can we correlate the research findings to evaluate the Community Pharmacy practice? The term 'non-pharmacist' needs more elaboration. Probably in the Introduction section, as I mentioned elsewhere.

Thank you for this comment. The following sentence has been added to the introduction section to better explain the term 'non-pharmacist': "In Germany, non-pharmacists (pharmacy technicians and pharmaceutical technical assistants) are permitted to advise on and sell medications in addition to pharmacists.'

- Table 4, response 8. Dispensing of a medication 175 (87.9%). What were these medications. Were there any antibiotics? What happened to the rest 22.1%? Why they did not dispense medications? These are some missing information and needs to be incorporated in the Results section.

Thank you for this comment. The relevant sentences have been restructured as follows: 'In 87.9% (n=175) of all visits a medication was dispensed, whereas in 22.1% (n=24) of all visits no medication was dispensed. Regarding the visits in which a medication was dispensed, in 77.2% (n=135) of visits loperamide was dispensed and in 11.4% (n=20) probiotics were dispensed, whereas, for example, antibiotics that require a prescription in Germany were not dispensed at all.' As described previously in the methods section, the guidelines expect that for such a condition that pharmacists are free to determine whether they also dispense a medication in addition to a mandatory referral to a doctor. It is therefore no wonder that a medication was not dispensed in all test purchases.

Discussion:

- The discussion can focus on reason for non-referral by the pharmacists. Are there skills related issues? Do the pharmacists possess adequate skills in assessing patients with diarrhea? These aspects may further enrich the discussion.

Thank you for this comment. To further enrich the discussion, the following sentence and an additional reference has been added: 'In regards to a lack of knowledge, pharmacists should receive greater training during their studies in patient consultations using examples [44] , especially as to date the teaching of such 'soft skills' in German universities has been below average compared to other European countries [55] .'

Limitations:

- Authors could explore any seasonal impact on the finding.

Thanks a lot for this comment. The following sentence and an additional reference to the limitations have been added: 'Carrying out the visits in winter only may have had a seasonal impact on the findings because the pharmacy staff may possibly have been more aware of this indication due to the increased occurrence of acute diarrhoea in the winter months and therefore the results of our study may have been better than at other times of the year [74] .'

Competing Interests: No competing interests were disclosed.

Reviewer Report 10 February 2020

https://doi.org/10.5256/f1000research.23162.r59628

Suleiman I. Sharif
Department of Pharmacy Practice and Pharmacotherapeutics, College of Pharmacy, University of Sharjah, Sharjah, United Arab Emirates

I thank you for trusting me with the review of this article which presents a well-designed and executed study. I do approve of indexing the article after some answers and minor corrections to be provided by the authors.

1. Ethical approval: I appreciate that in this study obtaining a written consent from the staff of the pharmacies would have greatly and negatively impacted the results and any "appropriate outcome" obtained would have been a biased one.

2. Pre-piloting the scenario with other than the researchers may have improved the approach.

3. The SPs made their request to the pharmacy staff who first approached them. Were the SPs certain whether "the pharmacy staff who first approached them" a pharmacist or pharmacy technician? In table 3, about 72% were not pharmacist and not able to determine. Moreover, the

authors stated in the results that “In most of the test purchases, the advising pharmacy staff were females, between 30 and 49 years of age and did not have a pharmacy degree (non-pharmacist)”. Since those they should practice under the supervision of a pharmacist, the authors need to elaborate on this in relation to their discussion where they state” Non-pharmacists (pharmaceutical technical assistants and pharmacy technicians) have a significantly higher likelihood of achieving the appropriate outcome than pharmacists”.

4. Point 2 must be also discussed in relation to their conclusion where they state” Furthermore, more questioning and involvement by non-pharmacists was identified as relevant factors influencing the appropriate outcome. There is a further need for research to identify why the advice provided is so often poor and particularly why the quality of advice provided by pharmacists is so inadequate”.

5. In table 5, under Queue and Number of questions asked the percentages do not total to 100%. Therefore, the authors need to check their original data, or declare “Missing data” in the table to total the percentage to 100%.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
No source data required

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Drug Utilization Studies, Pharmacy education, Pharmacy Practice , Neuropharmacology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 24 Apr 2020

Bernhard Langer, University of Applied Sciences Neubrandenburg, Neubrandenburg, Germany

We would like to thank the reviewer for taking the time to review our manuscript and also for the very helpful and detailed comments, recommendations and questions. See our point-by-point response to the reviewer’s comments below.

I thank you for trusting me with the review of this article which presents a well-designed and executed study. I do approve of indexing the article after some answers and minor corrections to be provided by the authors.

- Ethical approval: I appreciate that in this study obtaining a written consent from the staff of the pharmacies would have greatly and negatively impacted the results and any "appropriate outcome" obtained would have been a biased one.

Thank you for this comment. Yes, that is why we did not ask for consent to participate in advance. To clarify, the relevant sentence has been restructured as follows: 'CPs were not asked for consent to participate prior to the study being conducted because obtaining written consent would have significantly and negatively impacted the results.' Additionally, the following sentence was added: 'To resolve the issue of informed consent, the authors contacted the CPs by mail and email after the study informing them that an SP study had been conducted with the corresponding background information [48, 49] .'

- Pre-piloting the scenario with other than the researchers may have improved the approach.

Thank you for this comment. Therefore, the following sentences and an additional reference have been added to the limitations: 'Conducting the pilot study with persons other than the researchers may have improved the approach [73] , because the perspective of persons not involved in developing the study design would have been considered. On the other hand, carrying out the pilot study also aimed to train the SPs in the use of the methodology, which again would no longer have been possible.'

- The SPs made their request to the pharmacy staff who first approached them. Were the SPs certain whether "the pharmacy staff who first approached them" a pharmacist or pharmacy technician?

Thank you for this comment. This information was given in Table 2: 'Exact measurement based on the name tag, the receipt and, if necessary, using a telephone query by the SP after completing the test purchase.' Despite these efforts, the professional group of the pharmacy staff could not be determined in 55 of 199 test purchases.

- In table 3, about 72% were not pharmacist and not able to determine. Moreover, the authors stated in the results that "In most of the test purchases, the advising pharmacy staff were females, between 30 and 49 years of age and did not have a pharmacy degree (non-pharmacist)". Since those they should practice under the supervision of a pharmacist, the authors need to elaborate on this in relation to their discussion where they state ' Non-pharmacists (pharmaceutical technical assistants and pharmacy technicians) have a significantly higher likelihood of achieving the appropriate outcome than pharmacists.'

Thank you for this comment. We have expressed ourselves misleadingly. Therefore, we have deleted 'but only under the supervision of pharmacists' in the introduction. To better explain the word 'non-pharmacist', we have additionally restructured the sentence as follows: 'In Germany, non-pharmacists (pharmacy technicians and pharmaceutical technical assistants) are permitted to advise on and sell medications in addition to pharmacists.' Therefore, we believe that the sentence 'Non-pharmacists (pharmaceutical

technical assistants and pharmacy technicians) have a significantly higher likelihood of achieving the appropriate outcome than pharmacists.' in the discussion section is now clearer.

- Point 2 must be also discussed in relation to their conclusion where they state "Furthermore, more questioning and involvement by non-pharmacists was identified as relevant factors influencing the appropriate outcome. There is a further need for research to identify why the advice provided is so often poor and particularly why the quality of advice provided by pharmacists is so inadequate".

Thank you for this comment. Please see our remarks to your point 3. We have deleted 'but only under the supervision of pharmacists' and have restructured the relevant sentence in the introduction section as follows: 'In Germany, non-pharmacists (pharmacy technicians and pharmaceutical technical assistants) are permitted to advise on and sell medications in addition to pharmacists.' Therefore, we believe that the sentences 'Moreover, two or more questions and, surprisingly, the involvement of non-pharmacists were identified as relevant factors influencing the appropriate outcome.' in the conclusions and 'The findings of this study recommend further research to identify why the advice provided is so often poor and particularly why the quality of advice provided by pharmacists is so inadequate.' in the study recommendations is easier to understand.

- In table 5, under Queue and Number of questions asked the percentages do not total to 100%. Therefore, the authors need to check their original data, or declare "Missing data" in the table to total the percentage to 100%.

Thank you for this comment. We have checked all percentages reported in tables and made corrections if necessary.

Competing Interests: No competing interests were disclosed.

Reviewer Report 15 November 2019

https://doi.org/10.5256/f1000research.23162.r56075

?

Mohamed Izham Mohamed Ibrahim
Department of Clinical Pharmacy and Practice, College of Pharmacy, Qatar University, Doha, Qatar

Thank you for allowing me to review this article. It is an interesting study using an interesting approach i.e. SP. I have a few comments:

1. The conclusion in the abstract section must be consistent with the objective of the study and main findings.

2. Percentages reported in tables must equal to 100% - kindly check all figures.

3. Tables cited in the main text should in proper order.

4. Even though due to the nature of the study, subjects selected were not asked for consent, did the authors contact them after the study informing that a study was conducted with reasons? This is one way that the researchers could resolve the issue of informed consent prior to the study.

5. Create a paragraph on Study recommendations at the end of the Discussion section. Consider to move some parts of the conclusion. Rewrite the conclusion section.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Social-behavioral and Administrative aspects of health and pharmacy

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 24 Apr 2020

Bernhard Langer, University of Applied Sciences Neubrandenburg, Neubrandenburg, Germany

We would like to thank the reviewer for taking the time to review our manuscript and also for the very helpful and detailed comments, recommendations and questions. See our point-by-point response to the reviewer's comments below.

Thank you for allowing me to review this article. It is an interesting study using an interesting approach i.e. SP. I have a few comments:

- The conclusion in the abstract section must be consistent with the objective of the study and main findings.

Thank you for this comment. The conclusion has been restructured to be consistent with the objectives of the study and main findings.

- Percentages reported in tables must equal to 100% - kindly check all figures.

Thank you for this comment. We have checked all percentages reported in tables and made corrections if necessary.

- Tables cited in the main text should in proper order.

Thank you for this comment. We have ensured that the tables are cited in the correct order.

- Even though due to the nature of the study, subjects selected were not asked for consent, did the authors contact them after the study informing that a study was conducted with reasons? This is one way that the researchers could resolve the issue of informed consent prior to the study.

Thank you for this comment. Yes, we contacted the subjects after the study informing them that an SP study was conducted with reasons. Therefore, the following sentence and two additional references have been added: 'To resolve the issue of informed consent, the authors contacted the pharmacies by mail and email after the study informing them that an SP study had been conducted with the corresponding background information [48, 49] .'

- Create a paragraph on Study recommendations at the end of the Discussion section. Consider to move some parts of the conclusion. Rewrite the conclusion section.

Thank you for this comment. We have created a new paragraph on study recommendations at the end of the discussion section and have moved some parts of the conclusion to this new paragraph. Additionally, the conclusions section has been rewritten.

Competing Interests: No competing interests were disclosed.