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RESEARCH ARTICLE

Provision of pharmaceutical care by community pharmacists: a comparison across Europe

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Abstract *Objective* To investigate the provision of pharmaceutical care by community pharmacists across Europe and to examine the various factors that could affect its implementation. *Methods* A questionnaire-based survey of community pharmacies was conducted within 13 European countries. The questionnaire consisted of two sections. The first section focussed on demographic data and services provided in the pharmacy. The second section was a slightly adapted version of the Behavioral Pharmaceutical Care Scale (BPCS) which consists of three main dimensions (direct patient care activities, referral and consultation activities and instrumental activities). *Results* Response rates ranged from 10–71% between countries. The mean total score achieved by community pharmacists, expressed as a percentage of the total score achievable, ranged from 31.6 (Denmark) to 52.2% (Ireland). Even

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though different aspects of pharmaceutical care were implemented to different extents across Europe, it was noted that the lowest scores were consistently achieved in the direct patient care dimension (particularly those related to documentation, patient assessment and implementation of therapeutic objectives and monitoring plans) followed by performance evaluation and evaluation of patient satisfaction. Pharmacists who dispensed higher daily numbers of prescriptions in Ireland, Germany and Switzerland had significantly higher total BPCS scores. In addition, pharmacists in England and Ireland who were supported in their place of work by other pharmacists scored significantly higher on referral and consultation and had a higher overall provision of pharmaceutical care. *Conclusion* The present findings suggest that the provision of pharmaceutical care in community pharmacy is still limited within Europe. Pharmacists were routinely engaged in general activities such as patient record screening but were infrequently involved in patient centred professional activities such as the implementation of therapeutic objectives and monitoring plans, or in self-evaluation of performance.

Keywords Community pharmacy · Europe · Pharmaceutical care · Pharmacists

Impact of findings on practice

- The overall level of pharmaceutical care provision as measured by this survey suggested that pharmacists across Europe still have much to achieve in order for the provision of pharmaceutical care to be considered as routine practice.
- Community pharmacists were routinely engaged in general activities such as patient record screening but were infrequently involved in patient centred professional activities such as the implementation of therapeutic objectives and monitoring plans.
- Community pharmacists who dispensed higher daily numbers of prescriptions, who were supported in their place of work by other pharmacists or who were participating in additional health services had higher overall provision of pharmaceutical care in several European countries.

Introduction

The concept of pharmaceutical care, defined by Hepler and Strand as "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life" [1], has been adopted by professional pharmacy associations and academic training programmes throughout the world and has redirected the focus of the pharmacist's role within community practice from a traditional dispensing role to a more outcome-oriented, patient-centred practice [2, 3]. In addition to pharmacists' commitment and effort, several changes in the organization of pharmacists' work and payment systems are, however, required for implementation of pharmaceutical care to be realised [1, 4–6]. These include dealing with workplace issues such as heavy workload [7] and reimbursement systems, which are traditionally based on the number of products dispensed rather than on providing a holistic service [8]. There is also a need for pharmacists to collaborate with other health care professionals and patients in designing a therapeutic plan and to contribute to patient education on their medications and disease state [9].

A review of 22 randomised controlled trials of pharmaceutical care services from 1990 to 2003 [10], provided an evidence base for the effectiveness of pharmaceutical care services provided by pharmacists in improving patient outcomes and medication use. Much of the impetus for pharmaceutical care provision has been driven by academicians [11], and to date, there have been limited published data, on the extent to which pharmaceutical care has been adopted and implemented, particularly within community pharmacy, at either national or international level.

Rossing et al. [12] developed an instrument to measure the general provision of pharmaceutical care in all Danish community pharmacies ($n = 288$) in 1999. Their results led the authors to conclude that pharmaceutical care, in its fullest sense, as defined in policy documents in Denmark, was not evident in practice. An earlier measure, known as the Behavioral Pharmaceutical Care Scale (BPCS), was developed by Odedina and Segal [4] in the United States (US) to measure the perceived provision of pharmaceutical care through assessing a pharmacist's recent behavioural activities. This scale (slightly modified) was used to investigate the extent of implementation of various aspects of pharmaceutical care in community pharmacy in Northern Ireland in 1996 [13]. The results of both the US and Northern Ireland studies indicated a low levels of provision of a comprehensive pharmaceutical care service at that time.

The aim of the present study was to evaluate, using the BPCS scale, the current provision of pharmaceutical care by community pharmacists, across 13 European countries (including Northern Ireland), and the impact of a range of factors that could affect its implementation.

Methods

This study was initiated by researchers in Northern Ireland via their links with Pharmaceutical Care Network Europe

(PCNE; www.pcne.org). Following expressions of interest from various PCNE members, data were collected in: Belgium, Denmark, England, Germany, Iceland, Malta, Northern Ireland, Portugal, Republic of Ireland, Scotland, Sweden, the German-speaking part of Switzerland and Wales. Ethical approval was not required for the project, following consultation with the relevant research governance bodies in the participating countries.

Questionnaire/instrument

The questionnaire consisted of two sections; Section A contained 15 questions largely related to demographic information and services provided in the pharmacy; Section B had 34 questions and was a slightly adapted version of the BPCS [4, 13] to account for differences in practice across countries. The latter scale contains three dimensions: direct care activities, referral and consultation activities and instrumental activities. Fourteen subscales or domains contribute to these three dimensions and provide a score which equates to the overall level of pharmaceutical care provided. The maximum score possible is 160 and the minimum is 15.

The questionnaire was checked for face and content validity by representatives from the different participating countries, in particular its applicability and relevance to the practice of community pharmacy in each respective country. Furthermore, the questionnaire was translated into the native language(s) in the different countries as required, according to Guillemin's guidelines (http://ist.inserm.fr/basisateliers/atel127/guillemin.pdf). The questionnaire was piloted as a further check on validity with five community pharmacists in each country prior to general distribution. These pilot data were not included in the final analysis.

Questionnaire distribution and data collection

Addresses of community pharmacies in each of the participating European countries were obtained from their respective professional bodies/pharmaceutical associations. The sampling strategy was based on the number of community pharmacies in each participating country and was largely a pragmatic decision (Table 1). The research question was the degree of implementation of pharmaceutical care in each country. Using the findings of a previous study [13], pharmaceutical care implementation was assumed to be 21%. Assuming a 3% error estimate for a CI of 95% and using the total number of pharmacies in each of the participating countries as the population (e.g. Ireland = 1,339), the sample size was estimated accordingly (e.g. Ireland = 464). For each participant country, the response rate was assumed based on previous studies with a similar design, and accordingly, the number of questionnaires to be sent was calculated. In some cases, the questionnaire was sent to all community pharmacies, while in others, it was sent to a representative sample, based on the sample size calculation above. When less than 100% of pharmacies were surveyed, those surveyed were selected randomly (e.g. utilising a random number generator). Apart from Germany and Sweden, the questionnaire, along with a prepaid return envelope and covering letter, were sent to the selected pharmacies via regular mail with a second mailing to increase the response rate. In Germany, questionnaires were sent out only once, whereas in Sweden, the questionnaire was transformed into a web-based version and members were invited to participate online. The pharmacist who was most involved in patient care activities within the pharmacy was requested to respond and no identifiers were included to preserve anonymity. All mailings took place between November 2005 and December 2006.

Table 1 Sampling strategy for each participating country and their response rates

Countries	No. of pharmacies to which questionnaire was distributed	Sample as a % of total number of pharmacies in country	Response rates *N* (%)
Belgium	2,500	50	623 (24.9)
Denmark	321	100	137 (42.7)
England	1,096	10	327 (29.8)
Germany	7,151	33	725 (10.1%)
Iceland	56	100	20 (35.7)
Ireland	897	67	464 (51.7)
Malta	202	100	112 (55.4)
N. Ireland	514	100	213 (41.4)
Portugal	2,698	100	564 (20.9)
Scotland	600	51	250 (41.7)
Sweden	1,010	100	717 (70.9)
Switzerland	814	100	392 (48.2)
Wales	718	100	152 (21.2)
Overall	18,577	40	4,696 (25.3)

Instrument validity and reliability

The internal consistency of the instrument dimensions and domains was calculated for each country to obtain reliability estimates using Cronbach's alpha test. Reliability estimates for single-item scales, however, could not be calculated using Cronbach's alpha and were not reported in the present study. All reliability estimates >0.6 were considered acceptable as proposed by Robinson et al. [14].

To establish trait validity for the BPCS instrument, exploratory factor analysis (with Varimax rotation) was conducted for all dimensions and domains containing more

than two items (since factors with fewer than three items are generally weak and unstable [15]). Five or more strongly loading items are desirable and indicate a solid factor. In the BPCS scale, dimensions and domains containing more than two items had at least 6 items. The number of factors to be retained was decided upon using the Scree test as suggested by Costello and Osborne [15]; the test involved examining the plot of eigenvalues and counting the data-points above the natural 'bend' or 'break' in the data where the curve flattens out. If the number of factors was different from that projected by a priori factor structure, item loadings tables were compared and the one with the cleanest factor structure (item loadings >0.3, no or few item cross-loadings, no factor with <3 items) was chosen as the best fit to the data.

The adequacy of sample size was tested using the Kaiser–Meyer–Olkin (KMO) measure of sample adequacy and Bartlett's test of sphericity. The value of KMO > 0.5 indicates adequate sample. In addition, item-to-remainder correlations were calculated for each scale item belonging to a domain of activities with more than one item and were screened for extreme multicollinearity (i.e. highly correlated variables, $R > 0.8$) and singularity (perfectly correlated variables, $R > 0.9$). The determinant of the R-matrix was also calculated as a further check on multicolleniarity. If the determinant of the matrix is exactly zero, then the matrix is singular.

Data analysis

Data analysis was performed using SPSS v15 (SPSS Inc., Chicago, IL, US). Scores for the BPCS three dimensions and 14 domains were calculated, by adding up individual item scores. Country specific total scores were calculated by adding the scores of the three dimensions. In addition, as in previous research involving this instrument [13], respondents were categorised into providers (top 20%) and non-providers (bottom 20%) of pharmaceutical care at both country level and the overall sample level. Top/bottom 20% cut-off values were compared against another value (top/bottom 25%, i.e. upper/lower quartiles of BPCS scores) as a different form of categorisation.

The data were analysed for significant relationships between the dimension or domain totals and the demographic data collected at country level. The Pearson's correlation coefficient was used to test for correlation between continuous variables while the Student's t-test (independent samples) was used to assess differences in means between categorical variables. P-values for multiple pair-wise comparisons of BPCS dimensions and total scores between different countries were corrected as per the Bonferroni justification for multiple testing. P-values <0.05 were considered statistically significant.

Results

The response rates for participating countries ranged from 10.1 (Germany) to 70.9% (Sweden) (Table 1). There were generally more female than male respondents in all participating countries, apart from England and Iceland. In addition, there was a marked variation in the types and locations of pharmacy which predominated in each country. In Portugal, Denmark, Belgium, Germany, Switzerland, Malta and Ireland most respondents worked in an independent pharmacy, while in the United Kingdom (UK; England, Wales, Scotland and Northern Ireland), Sweden and Iceland many pharmacists worked in large multiples (chains), Table 2.

For most pharmacies in the UK, Iceland, Ireland and Malta there was usually only one full-time equivalent pharmacist per pharmacy. This was in contrast to Denmark, Germany, Switzerland and Portugal where at least half of the pharmacies had two or more full-time equivalent pharmacists per pharmacy. Dispensing staff also varied across countries with Denmark reporting a mean of 9.2 dispensing staff per pharmacy followed by Switzerland (mean of 4.4). In addition, a pre-registration student (a pharmacy graduate undergoing a training internship prior to professional registration) was employed to a greater extent in Denmark, Belgium and Iceland than in other countries.

There was a variation across countries in terms of the number of items dispensed per day (the mean ranged from 62.2–884.5 prescriptions per day). The majority (at least 75%) of pharmacies in Sweden and Denmark did not participate in the health services surveyed (question A15; health screening, patient monitoring and domiciliary visiting). Furthermore, the majority of pharmacies in Sweden and Denmark did not have a private consultation area.

Even thought the majority (≥53%) of responding pharmacists in all participating countries (apart from Switzerland) did not have a post-graduate qualification, most respondents (with the exception of those in Iceland) participated regularly in continuing professional development to maintain and improve their competency. The majority of respondents, however, did not participate in regular local multi-disciplinary team meetings in any of the countries surveyed.

The BPCS showed acceptable Cronbach's alpha values for BPCS dimensions and domains in all countries surveyed (Table 3) apart from 'documentation' domain in Northern Ireland and Sweden and 'instrumental activities' dimension in Sweden. KMO values for each country and for the pooled data from all countries were greater than 0.5 (range, 0.715–0.874) indicating relatively compact pattern of correlations between scale items and, hence, higher probability of getting distinct and reliable factors from the analysis [16]. The Bartlett's test was significant ($P < 0.05$)

Table 2 Demographic characteristics of participating pharmacists

	Country Name												
	Belgium	Denmark	England	Germany	Ireland	Malta	N. Ireland	Portugal	Scotland	Sweden	Switzerland	Wales	Iceland
Gender													
Male (%)	42.7	16.8	57	38.8	48.7	36.6	45.1	21.8	37.6	6.7	38.3	49.3	50.0
Female (%)	57.3	82.5	43	59.7	51.3	63.4	54.9	78.2	62.4	92.9	61.0	50.7	45.0
Missing (%)	0.0	0.7	0	1.5	0.0	0.0	0.0	0.0	0.0	0.4	0.8	0.0	5.0
Year of registration													
1950–1969 (%)	2.2	4.4	8	7.7	2.4	8.9	0.0	1.6	1.6	10.9	4.1	2.0	0.0
1970–1989 (%)	51.4	51.1	49	48.8	20.9	33.0	26.3	22.0	46.4	43.8	55.1	46.7	25.0
1990–2008 (%)	45.6	40.9	43	39.4	74.4	57.1	70.0	73.0	49.6	45.0	38.3	50.7	50.0
Missing (%)	0.8	3.6	1	4.0	2.4	0.9	3.8	3.4	2.4	0.3	2.6	0.7	25.0
Type of pharmacy[a]													
Independent (%)	82.7	100.0	36	96.6	64.4	87.5	40.8	100.0	30.4	0.0	87.2	29.6	20.0
Small multiple (>4 pharmacies) (%)	3.2	0.0	13	0.0	15.3	12.5	13.1	0.0	16.4	0.0	0.0	11.2	10.0
Large multiple (10+ pharmacies) (%)	13.8	0.0	51	2.5	20.0	0.0	45.5	0.0	53.2	100.0	12.0	59.2	70.0
Missing (%)	0.3	0.0	0	1.0	0.2	0.0	0.5	0.0	0.0	0.0	0.8	0.0	0.0
Location													
Rural (%)	32.6	17.5	14	31.0	27.2	13.4	23.0	27.8	21.6	17.2	36.0	25.0	10.0
Suburban (%)	29.4	51.1	36	14.8	30.0	30.4	27.7	17.0	30.4	11.6	17.3	31.6	20.0
City or town centre (%)	23.6	27.0	35	18.1	40.5	51.8	38.5	36.3	38.4	18.4	25.0	30.3	70.0
Out of town (%)	13.8	2.9	7	14.3	1.5	3.6	4.2	17.4	6.0	15.5	12.8	6.6	0.0
Health centre (%)	0.0	0.0	6	21.7	0.4	0.0	2.8	0.0	2.8	36.7	8.4	4.6	0.0
Missing (%)	0.6	1.5	2	0.1	0.4	0.9	3.8	1.4	0.8	0.7	0.5	2.0	0.0
Pre-registration student employed?													
Yes (%)	39.8	27.0	13	10.1	10.8	31.3	33.3	14.4	13.2	15.1	15.1	7.2	45.0
Missing (%)	0.3	0.7	1	0.3	0.6	0.0	0.5	0.5	0.8	3.2	0.5	0.0	0.0
CPD participation?													
Yes (%)	81.2	89.8	94	95.4	78.9	62.5	94.4	97.9	93.2	61.5	96.2	97.4	25.0
Missing (%)	1.8	0.0	1	0.3	0.9	0.0	0.0	0.2	1.2	3.8	1.0	0.7	0.0
Postgrad qualification?													
Yes (%)	3.9	43.8	19	46.9	14.0	2.7	8.5	11.2	18.4	3.2	71.9	11.8	5.0
Missing (%)	0.3	0.7	1	0.1	1.1	0.0	0.5	0.9	0.4	1.3	0.0	2.0	0.0
Participation in multi-disciplinary meetings?													
Yes (%)	34.7	29.9	28	23.2	9.1	11.6	14.1	12.8	22.4	10.5	20.4	19.1	15.0
Missing (%)	0.5	0.7	1	0.3	1.7	0.0	0.9	1.2	0.4	3.3	0.3	0.7	0.0

Table 2 continued

	Country Name												
	Belgium	Denmark	England	Germany	Ireland	Malta	N. Ireland	Portugal	Scotland	Sweden	Switzerland	Wales	Iceland
Consultation area?													
Yes (%)	18.8	46.0	66	81.0	55.8	75.9	49.8	85.8	69.2	31.7	77.0	59.9	70.0
Missing (%)	1.0	0.7	1	0.0	1.3	0.0	0.0	0.2	0.8	3.2	0.0	0.7	0.0
Information available from GP?													
Yes (%)	41.7	43.1	64	56.6	77.8	59.8	81.2	30.5	80.4	31.7	63.8	76.3	60.0
Missing (%)	14.3	24.8	3	1.9	3.4	0.9	3.8	68.6	3.2	3.2	5.1	4.6	25.0
Participate in health screening?													
Yes (%)	89.1	20.4	34	96.0	27.6	34.8	38.0	76.1	37.6	7.9	84.9	32.2	5.0
Missing (%)	1.1	4.4	3	0.0	3.4	0.0	6.1	4.1	5.6	4.5	0.0	2.0	95.0
Participate in patient monitoring?													
Yes (%)	55.9	5.1	34	65.1	52.6	43.8	45.1	45.0	46.0	10.6	75.8	33.6	0.0
Missing (%)	1.9	6.6	4	0.7	3.0	0.0	5.6	6.4	5.2	4.9	0.8	3.9	100.0
Participate in domiciliary visiting?													
Yes (%)	50.1	0.0	21	53.0	22.8	3.6	42.3	12.4	45.2	0.0	29.3	24.3	5.0
Missing (%)	0.8	5.1	3	0.4	3.7	0.0	4.7	10.6	4.4	5.6	1.3	4.6	95.0
Participate in health promotion/education?													
Yes (%)	95.5	48.9	91	81.2	77.2	58.0	95.8	81.0	90.0	21.1	89.3	88.2	10.0
Missing (%)	1.4	1.5	1	0.3	1.7	0.0	0.0	2.7	0.4	4.0	0.3	0.7	90.0
No. of full time equivalent pharmacists													
Mean (SD)	n/a	2.18 (1.20)	1.29 (0.68)	2.08 (3.90)	1.46 (0.66)	1.23 (0.46)	1.25 (0.48)	2.26 (1.22)	1.24 (0.50)	0.58[b] (1.02)	1.83 (1.12)	1.17 (0.49)	1.53 (1.02)
No. of dispensing staff													
Mean (SD)	1.12 (1.48)	9.21 (5.20)	2.52 (1.74)	3.20 (4.73)	1.69 (1.51)	1.17 (1.06)	2.10 (1.52)	2.39 (1.44)	2.63 (1.94)	1.89 (2.23)	4.36 (3.98)	2.41 (1.48)	3.36 (2.50)
No. of items dispensed per day													
Mean (SD)	78.0 (55.84)	884.5 (515.3)	393.5 (915.4)	107.3 (71.0)	158.3 (92.2)	27.2 (17.2)	219.1 (136.8)	217.3 (205.9)	237.9 (129.3)	294.6 (177.7)	62.2 (47.0)	262.7 (147.7)	88.8 (17.3)

CPD continuing professional development, *GP* general practitioner

[a] At the time of the study, national legislation did not permit the existence of chain pharmacies in Portugal or Denmark, therefore all pharmacies were classified as independent. In Sweden all pharmacies were State owned, and hence were categorized as large multiples. It is also important to note that the different distribution method of the questionnaire in Sweden may have influenced the response rate

[b] In Sweden, a majority of the respondents were prescriptionists with a 3-year pharmaceutical university education

Table 3 Reliability estimates of BPCS dimensions and domains by country

	Reliability estimate (Cronbach's alpha)											
	Belgium ($n = 623$)	Denmark ($n = 137$)	England ($n = 327$)	Germany ($n = 725$)	Ireland ($n = 464$)	Malta ($n = 112$)	N. Ireland ($n = 213$)	Portugal ($n = 564$)	Scotland ($n = 250$)	Sweden ($n = 717$)	Switzerland ($n = 392$)	Wales ($n = 152$)
Direct patient care activities (*N* of items = 17)	0.85	0.84	0.86	0.87	0.83	0.88	0.81	0.88	0.82	0.81	0.83	0.84
Documentation (*N* of items = 6)	0.67	0.71	0.61	0.74	0.63	0.66	0.52	0.85	0.65	0.49	0.68	0.6
Patient assessment (*N* of items = 6)	0.85	0.78	0.87	0.84	0.81	0.84	0.87	0.85	0.85	0.83	0.81	0.87
Referral and consultation (*N* of items = 8)	0.7	0.79	0.79	0.76	0.79	0.8	0.79	0.73	0.78	0.67	0.74	0.77
Instrumental activities (*N* of items = 7)	n/a*	0.63	0.68	0.69	0.62	0.67	0.67	0.68	0.69	0.57	0.67	0.67

* Reliability estimate for instrumental activities could not be calculated for Belgium since item B34 was missing for all respondents

for all countries indicating that the *R*-matrix is not an identity matrix and, hence, adequate for performing factor analysis. The determinant of the *R*-matrix in all countries was non-zero and, hence, there was no problem of multicollinearity or singularity in the data. In addition, an examination of the correlation matrices did not yield any unreasonable values (i.e. all values were <0.8).

Orthogonal rotation was chosen since BPCS domains were hypothesized to be uncorrelated when the scale was first developed [4]. In addition, Scree test suggested the retention of 4 factors (Fig. 1) which was in accordance with the BPCS *a priori* factor structure (four domains contain >2 scale-items; 'documentation', 'patient assessment', 'patient referral and consultation' and 'instrumental activities'). After rotation, item loadings on the extracted factors (with a specified minimum value of 0.3) resulted in a clean structure that conformed with the distribution of BPCS items in the four domains mentioned above with very minimal cross-loadings. Average absolute item-loading on extracted factors for all countries ranged from 0.504–0.616. For a pooled data from all countries, item loading ranged from 0.306–0.829. Table 4 shows rotation sums of the squared factor loadings of the 4 extracted domains on the construct of pharmaceutical care behaviour as well as the proportion of variability explained by each domain. *Convergent* validity of the BPCS scale was demonstrated by adequate loadings of scale-items on the predicted factors and *divergent* validity was confirmed by the fact that correlations between factors were not so high (values were <0.85 for all countries). This indicated that predicted factors did not overlap significantly. Finally, an inspection of item communalities did not yield any spurious solutions (i.e. did not exceed 1.0) for any county. Average item communalities ranged from 0.421–0.483 for the countries surveyed and from 0.26–0.70 for the pooled data.

The mean total BPCS scores ranged from 50.6 (Denmark) to 83.5 (Ireland), Table 5. Total scores for Iceland could not be calculated due to missing data for most subscales of the 'direct patient care activities' dimension. Moreover, due to the small number of overall responses for Iceland ($n = 20$), its scores could not be included in the subsequent analyses. Table 6 illustrates the categorisation of pharmacies within each country into two groups, 'providers' and 'non-providers' of pharmaceutical care according to the upper/lower quartiles of BPCS scores (as cut-off values of providers/non-providers, respectively) compared with the earlier categorisation of Odedina and Segal [4] (i.e. top/lower 20% of BPCS scores).

Ireland had significantly higher total scores than other countries ($P < 0.001$). Denmark had the lowest mean total score ($P < 0.001$) followed by Sweden ($P < 0.001$; Fig. 2). In general, pharmacists scored less well on 'direct

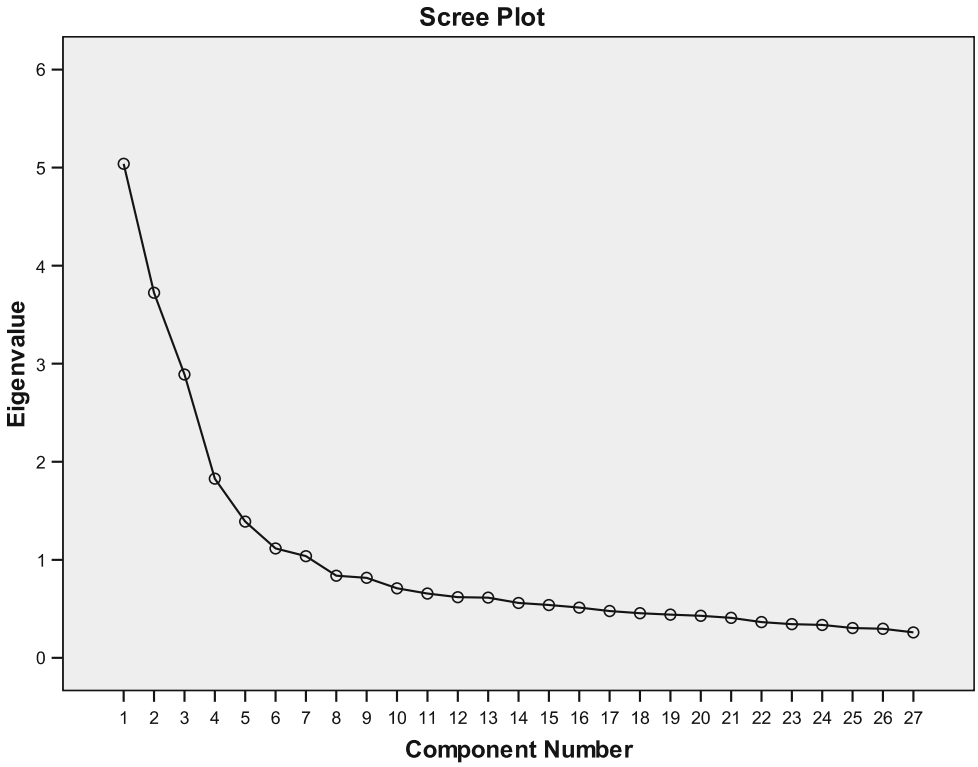


Fig. 1 Scree plot of the extracted components versus their eigenvalues for a pooled data from all European countries surveyed

Table 4 Exploratory factor analysis of BPCS domains

Domain	Rotation sums of squared loadings	% Of variance explained by domain
Documentation	2.502	9.266
Patient assessment	3.727	13.805
Referral and consultation	4.228	15.658
Instrumental activities	3.023	11.197

patient care activities' (means ranged from 17.9 to 43.8% of the maximum achievable score) than on the 'referral and consultation' (means ranged from 39.4 to 70.1%) or the 'instrumental activities' dimension (means ranged from 50.6 to 70.3%). Ireland had the highest scores for 'direct patient care activities' ($P < 0.001$ when compared with the other countries apart from Switzerland). Pharmacists from Ireland scored well on documentation activities related to patient care, patient record screening, verification of patient understanding, patient consultation and implementation of therapeutic objectives and monitoring plans. In comparison with the rest of the group, the UK scored well on documentation and patient record screening but poorly on activities conducted to evaluate patients' perceived status (patient assessment subscale). Conversely, pharmacists in Malta and Portugal scored poorly on documentation and patient record screening but very well on patient assessment and verification of patient understanding.

Wales, Malta and Portugal had the highest scores for 'referral and consultation activities' ($P < 0.001$). Denmark had the lowest scores for that dimension ($P < 0.05$) followed by Switzerland ($P < 0.005$). The responding pharmacists in Ireland and the UK (apart from Wales) had the highest scores for the 'instrumental activities' dimension ($P < 0.001$) despite the fact that they generally failed to evaluate patient satisfaction or their own performance in providing pharmaceutical care. In contrast, Wales, Malta and Portugal scored poorly for 'instrumental activities' but very well on evaluation of patient satisfaction and performance evaluation subscales.

There were several significant relationships between the respondents' demographic characteristics and their BPCS scores (Table 7). In England and Ireland, the provision of pharmaceutical care was more extensive when there was a higher number of pharmacists employed ($P = 0.001$ and $P = 0.024$, respectively). Furthermore, 'referral and consultation activities' in both countries increased as the number of employed pharmacists increased ($r = 0.251$, $P < 0.001$ and $r = 0.155$, $P = 0.002$, respectively). The latter situation was also true for Switzerland ($r = 0.212$, $P < 0.001$) and Belgium ($r = 0.175$, $P < 0.001$). In Sweden and Portugal, the total number of full-time pharmacists had a positive impact on the score obtained for 'direct patient care activities' which specifically seeks to capture

Table 5 Respondents' scores on modified behavioral pharmaceutical care scale

	Country name												
	Belgium	Denmark	England	Germany	Ireland	Malta	N. Ireland	Portugal	Scotland	Sweden	Switzerland	Wales	Iceland
Direct patient care activities total													
Mean	32.79	15.19	29.00	31.95	37.25	28.22	30.49	29.01	28.20	22.61	35.59	25.81	n/a
Valid *N* (%)	483 (78)	104 (76)	277 (85)	671 (93)	382 (82)	112 (100)	184 (86)	460 (82)	204 (82)	460 (64)	354 (90)	152 (100)	0 (0)
Minimum	0	0	0	0	2	0	0	0	3	0	0	0	n/a
Maximum	85	62	79	85	71	71	74	81	85	80	84	69	n/a
Documentation total													
Mean	7.11	2.02	9.39	7.71	10.32	2.12	9.28	3.33	9.37	3.42	10.50	8.19	n/a
Valid *N* (%)	516 (83)	112 (82)	279 (85)	713 (98)	394 (85)	112 (100)	187 (88)	472 (84)	206 (82)	477 (67)	373 (95)	152 (100)	0 (0)
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	n/a
Maximum	30	28	28	30	25	18	26	30	30	25	30	25	n/a
Patient assessment total													
Mean	12.29	7.17	5.98	12.56	9.73	14.20	6.63	15.08	5.16	9.54	10.36	4.76	n/a
Valid *N* (%)	587 (94)	126 (92)	305 (93)	718 (99)	434 (94)	112 (100)	203 (95)	529 (94)	230 (92)	523 (73)	380 (97)	152 (100)	0 (0)
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	n/a
Maximum	30	20	28	30	30	30	29	30	30	30	30	24	n/a
Implementation of therapeutic objectives and monitoring plans total													
Mean	3.11	1.11	2.59	3.03	3.76	2.79	3.26	1.67	2.76	2.31	3.02	2.04	0.31
Valid *N* (%)	534 (86)	114 (83)	299 (91)	688 (95)	404 (87)	112 (100)	192 (90)	491 (87)	222 (89)	501 (70)	370 (94)	152 (100)	16 (80)
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum	10	10	10	10	10	10	10	10	10	10	10	10	4
Patient record screening total													
Mean	3.25	0.63	4.43	3.04	4.57	1.52	4.47	0.92	4.62	0.47	4.32	4.45	1.00
Valid *N* (%)	606 (97)	128 (93)	312 (95)	724 (100)	462 (100)	112 (100)	206 (97)	529 (94)	235 (94)	543 (76)	389 (99)	152 (100)	5 (25)
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	1
Patient consultation total													
Mean	3.61	1.98	3.09	2.52	4.35	3.46	3.53	4.10	3.17	2.64	3.66	3.08	1.00
Valid *N* (%)	612 (98)	127 (93)	312 (95)	723 (100)	461 (99)	112 (100)	207 (97)	555 (98)	235 (94)	578 (81)	388 (99)	152 (100)	9 (45)
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	1

Table 5 continued

	Country name												
	Belgium	Denmark	England	Germany	Ireland	Malta	N. Ireland	Portugal	Scotland	Sweden	Switzerland	Wales	Iceland
Verification of patient understanding total													
Mean	3.77	2.20	3.37	3.31	4.33	4.14	3.71	4.46	3.43	4.10	4.15	3.28	1.00
Valid *N* (%)	611 (98)	127 (93)	311 (95)	721 (99)	462 (100)	112 (100)	207 (97)	555 (98)	235 (94)	593 (83)	387 (99)	152 (100)	3 (15)
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	1
Referral and consultation total													
Mean	20.74	15.76	20.71	20.36	22.74	27.04	19.79	27.96	20.85	19.81	17.81	28.02	15.00
Valid *N* (%)	562 (90)	118 (86)	312 (95)	701 (97)	417 (90)	112 (100)	199 (93)	496 (88)	222 (89)	538 (75)	380 (97)	152 (100)	13 (65)
Minimum	9	8	6	9	10	10	8	10	9	9	8	13	9
Maximum	40	33	38	36	40	40	37	40	39	37	40	40	30
Instrumental activities total													
Mean	20.95	19.63	24.59	18.93	24.02	18.85	23.75	18.81	24.31	20.93	20.23	17.71	19.27
Valid *N* (%)	569 (91)	113 (82)	317 (97)	688 (95)	436 (94)	112 (100)	209 (98)	525 (93)	235 (94)	576 (80)	380 (97)	152 (100)	15 (75)
Minimum	9	7	9	9	9	7	13	7	12	9	8	9	12
Maximum	35	29	35	33	35	35	32	33	35	32	35	35	28
Counsellling location total													
Mean	2.78	2.65	3.79	3.10	3.98	2.54	3.75	2.53	3.82	2.40	2.98	2.24	2.78
Valid *N* (%)	614 (99)	133 (97)	322 (98)	725 (100)	460 (99)	112 (100)	209 (98)	552 (98)	247 (99)	602 (84)	392 (100)	152 (100)	18 (90)
Minimum	1	1	1	1	1	1	1	1	1	1	1	1	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	5
Filled script validation total													
Mean	3.32	3.78	4.61	1.66	4.58	1.96	4.87	2.01	4.62	3.62	2.58	1.43	4.83
Valid *N* (%)	596 (96)	134 (98)	322 (98)	700 (97)	460 (99)	112 (100)	210 (99)	537 (95)	244 (98)	607 (85)	389 (99)	152 (100)	18 (90)
Minimum	1	1	1	1	1	0	3	1	1	1	1	1	3
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	5
Infomational support total													
Mean	4.04	3.95	3.62	3.16	3.95	2.76	3.58	2.67	3.54	4.30	3.69	2.47	3.39
Valid *N* (%)	617 (99)	135 (99)	323 (99)	720 (99)	462 (100)	112 (100)	210 (99)	551 (98)	246 (98)	610 (85)	392 (100)	152 (100)	18 (90)
Minimum	1	1	1	1	1	1	1	1	1	1	1	1	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	5
Evaluation of patient satisfaction total													
Mean	1.85	1.50	2.16	2.31	1.93	3.53	1.85	3.67	2.05	2.69	2.32	3.88	1.82
Valid *N* (%)	615 (99)	131 (96)	322 (98)	721 (99)	455 (98)	112 (100)	210 (99)	548 (97)	244 (98)	606 (85)	392 (100)	152 (100)	17 (85)

Table 5 continued

	Country name												
	Belgium	Denmark	England	Germany	Ireland	Malta	N. Ireland	Portugal	Scotland	Sweden	Switzerland	Wales	Iceland
Minimum	1	1	0	1	1	1	1	1	1	1	1	1	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	4
Competency improvement total													
Mean	3.38	2.47	3.95	3.69	3.25	2.83	3.63	2.61	3.94	2.97	3.72	1.99	1.71
Valid *N* (%)	615 (99)	116 (85)	323 (99)	720 (99)	456 (98)	112 (100)	210 (99)	550 (98)	247 (99)	605 (84)	388 (99)	152 (100)	17 (85)
Minimum	1	1	1	1	1	0	1	1	1	1	1	1	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	4
Performance evaluation total													
Mean	1.95	1.68	2.59	1.70	2.18	2.98	2.18	3.58	2.49	1.50	1.87	3.59	1.47
Valid *N* (%)	615 (99)	128 (93)	319 (98)	720 (99)	443 (95)	112 (100)	210 (99)	545 (97)	243 (97)	602 (84)	386 (98)	152 (100)	15 (75)
Minimum	1	1	0	1	1	0	1	1	1	1	1	1	1
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	3
Provision of medical information total													
Mean	3.60	3.73	3.90	3.39	4.03	2.25	3.90	1.77	3.94	3.47	3.13	2.13	3.47
Valid *N* (%)	615 (99)	131 (96)	323 (99)	725 (100)	459 (99)	112 (100)	210 (99)	550 (98)	248 (99)	605 (84)	391 (100)	152 (100)	17 (85)
Minimum	1	1	1	1	1	1	1	1	1	1	1	1	2
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	5
Total BPCS score													
Mean	74.10	50.61	73.94	70.77	83.48	74.12	73.97	76.48	73.06	62.88	73.22	71.54	n/a
Valid *N* (%)	425 (68)	83 (61)	266 (81)	624 (86)	337 (73)	112 (100)	172 (81)	409 (73)	179 (72)	404 (56)	339 (86)	152 (100)	0 (0)
Minimum	29	23	18	19	32	43	29	27	32	23	28	39	n/a
Maximum	131	113	140	145	132	113	129	130	152	124	140	105	n/a

Table 6 Summary of providers and non-providers of pharmaceutical care by country based on BPCS scores

Countries	BPCS score range	Score range of non-providers[a] (cut-off as % of maximum score)		Score range of providers[a] (cut-off as % of maximum score)		% Of non-providers overall[b]		% Of providers overall[b]	
		Bottom 20%	Bottom 25%	Top 20%	Top 25%	Bottom 20%	Bottom 25%	Top 20%	Top 25%
Belgium	29–131	29–56 (35%)	29–60 (38%)	91–131 (57%)	88–131 (55%)	12.1%	11.7%	25.2%	28.9%
Denmark	23–113	23–35 (22%)	23–37 (23%)	66–113 (41%)	63–113 (39%)	8.4%	6.4%	4.8%	6.0%
England	18–140	18–55 (34%)	18–59 (37%)	93–140 (58%)	90–140 (56%)	8.2%	8.2%	26.7%	29.7%
Germany	19–145	19–52 (33%)	19–55 (34%)	90–145 (56%)	86–145 (54%)	23.7%	22.4%	21.5%	26.0%
Ireland	32–132	32–68 (43%)	32–73 (46%)	99–132 (62%)	97–132 (61%)	4.1%	4.5%	43.0%	49.0%
Malta	43–113	43–64 (40%)	43–66 (41%)	85–113 (53%)	83–113 (52%)	1.0%	1.6%	11.6%	20.5%
N. Ireland	29–129	29–58 (36%)	29–61 (38%)	91–129 (57%)	88–129 (55%)	4.7%	4.3%	25.0%	26.7%
Portugal	27–130	27–66 (41%)	27–68 (43%)	86–130 (54%)	84–130 (53%)	2.0%	2.9%	17.4%	23.5%
Scotland	32–152	32–58 (36%)	32–60 (38%)	87–152 (54%)	84–152 (53%)	4.0%	5.6%	19.6%	24.6%
Sweden	23–124	23–50 (31%)	23–51 (32%)	77–124 (48%)	73–124 (46%)	21.7%	20.2%	6.2%	9.9%
Switzerland	28–140	28–58 (36%)	28–60 (38%)	89–140 (56%)	86–140 (54%)	8.2%	9.7%	22.4%	27.1%
Wales	39–105	39–62 (39%)	39–64 (40%)	81–105 (51%)	79–105 (49%)	1.8%	2.6%	9.9%	15.8%

[a] Within top/bottom 20% at country level

[b] Within top/bottom 20% when all data from 13 countries are combined

pharmacists' efforts to provide pharmaceutical care ($r = 0.123$, $P = 0.008$ and $r = 0.127$, $P = 0.007$, respectively).

Pharmacists in England, Scotland, Northern Ireland and Ireland who employed a higher number of dispensing staff achieved higher scores on the validation of filled prescriptions compared to those who had fewer numbers of assistants ($r = 0.170$, $P = 0.002$; $r = 0.142$, $P = 0.026$; $r = 0.160$, $P = 0.021$ and $r = 0.131$, $P = 0.005$, respectively). In addition, there was a significant positive relationship between the total number of dispensing staff in Portugal and the verification of patient understanding ($r = 0.114$,$P = 0.008$).

In Ireland, Germany and Switzerland, there was a further significant relationship between pharmacists' BPCS total scores and the total number of dispensed items per day ($P = 0.008$, $P = 0.002$ and $P = 0.044$, respectively; Table 7). The pharmacists' perception of the pharmaceutical care provided, as measured by the BPCS, was higher among those who worked in pharmacies with a higher prescription turnover. The number of dispensed items per day, however, had a negative impact on performance evaluation and the evaluation of patient satisfaction in Sweden ($r = -0.187$, $P < 0.001$ and $r = -0.094$, $P = 0.022$, respectively).

In all of the participating countries (except Malta and Wales), there was a statistically significant relationship between the provision of at least one of the health services (health screening; patient monitoring; domiciliary visiting; health promotion/education) and having higher BPCS total scores. The service that was related to the greatest increase in BPCS total scores was patient monitoring (mean difference ranged from 3.8 to 27.4 units) followed by the provision of health screening (mean difference was 6.1–19.6 units).

Discussion

This is considered the first attempt to carry out a formal quantitative assessment of pharmacists' efforts to provide pharmaceutical care across Europe. Even though there is an international consensus about the components and processes of pharmaceutical care, which have not changed since the BPCS was used in NI [13], the validity and reliability of this scale have been rechecked and examined in the present study. This enabled the use of BPCS scale as a valid tool for the purposes of comparison across a wide range of countries in the European context.

In common with other research involving the instrument, pharmacists scoring in the top 20% on the BPCS were considered providers of pharmaceutical care while those scoring in the bottom 20% were considered non-

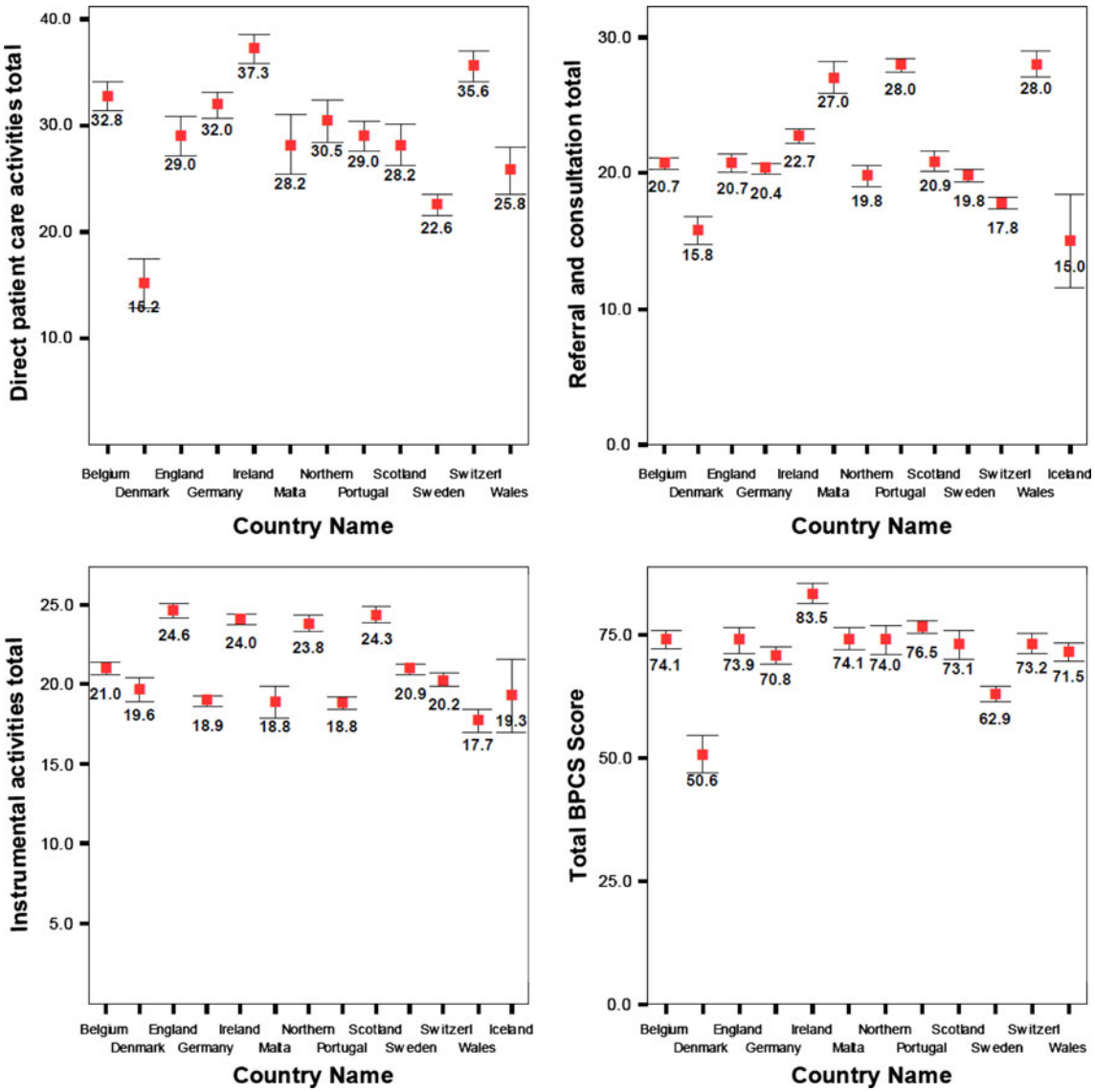


Fig. 2 Modified BPCS dimensions and total scores by country. *Error bars* represent means ± 95% CI

providers. To be classified as providers of pharmaceutical care at the country level, pharmacists had to achieve different total BPCS scores across the different participating countries. For example, they had to have a total BPCS score of at least 66 (in Denmark) to be considered providers while at least 99 (in Ireland), representing only 41.3–61.9% of the maximum achievable BPCS score. To be classified as non-providers of pharmaceutical care, pharmacists had to score less than 21.9% (in Denmark) while less than 42.5% (in Ireland) of the maximum achievable score. Comparable results were found when upper/lower quartiles were applied as a method of classifying pharmacists into providers and non-providers, particularly in terms of the countries that have the highest and lowest percentages of providers/non-providers of pharmaceutical care.

The mean total BPCS score achieved by pharmacists, expressed as a percentage of the total score achievable, ranged from 31.6% (Denmark) to 52.2% (Ireland). The overall level of pharmaceutical care provision as measured by this survey suggested that pharmacists across Europe still have much to achieve in order for the provision of pharmaceutical care to be considered as routine practice.

It is apparent that the different aspects of pharmaceutical care were implemented to differing degrees across Europe. However, if the overall mean scores for BPCS domains and dimensions for all participating countries were considered, some general conclusions can be drawn. The lowest mean scores were achieved in the direct patient care dimension, particularly in those related to documentation, patient assessment and implementation of therapeutic objectives and monitoring plan domains; mean scores were under a

Table 7 Summary of relationships between demographic and practice characteristics and mean total BPCS score by country

Country	Gender	Pre-Registration Student employed?		CPD participation?		Post-grad qualification?		Participation in multi-disciplinary meetings?		Consultation area?		Participate in Health screening?		Participate in patient monitoring?		Participate in domiciliary visiting?		Participate in health promotion/ education?		Year of Registration	No. of full time equivalent pharmacists	No. of dispensing staff	No. of items dispensed per day
		Mean		Mean		Mean		Mean		Mean		Mean		Mean		Mean		Mean		Pearson (r)	Pearson (r)	Pearson (r)	Pearson (r)
Belgium	Male	73.5	Yes	75.1	Yes	75.6**	Yes	74.2	Yes	78.2**	Yes	78.2*	Yes	75.7**	Yes	79.8**	Yes	76.3*	Yes	74.8**	0.147**	n/a	0.022	0.019
	Female	74.7	No	73.4	No	68.6**	No	74.1	No	71.8**	No	73.3*	No	60.8**	No	67.2**	No	72.0*	No	56.5**				
Denmark	Male	50.9	Yes	47.3	Yes	50.3	Yes	52.0	Yes	63.7**	Yes	53.4	Yes	53.5	Yes	75.0**	Yes	n/a	Yes	55.5*	0.123	−0.022	0.055	−0.022
	Female	50.8	No	51.7	No	52.3	No	49.8	No	45.7**	No	48.1	No	49.4	No	47.6**	No	49.8	No	46.5*				
England	Male	73.7	Yes	79.1	Yes	74.9**	Yes	76.1	Yes	85.4**	Yes	77.1**	Yes	82.6**	Yes	84.4**	Yes	86.4**	Yes	74.7	0.192**	0.200**	0.102	0.047
	Female	74.3	No	73.1	No	56.0**	No	73.7	No	69.6**	No	68.1**	No	69.5**	No	68.5**	No	71.1**	No	67.6				
Germany	Male	68.5*	Yes	77.7**	Yes	71.7**	Yes	71.9	Yes	80.1**	Yes	72.6**	Yes	71.6**	Yes	75.0**	Yes	75.3**	Yes	73.3**	−0.020	0.035	0.035	0.131**
	Female	72.3*	No	70.0**	No	53.2**	No	69.8	No	68.0**	No	63.3**	No	52.0**	No	62.3**	No	65.7**	No	60.3**				
Ireland	Male	81.1*	Yes	88.4	Yes	85.3**	Yes	91.5**	Yes	94.5**	Yes	84.9	Yes	89.9**	Yes	88.7**	Yes	95.0**	Yes	85.0**	0.111*	0.124*	0.087	0.145**
	Female	85.7*	No	82.9	No	76.2**	No	82.3**	No	82.4**	No	81.7	No	80.6**	No	77.4**	No	79.8**	No	78.1**				
Malta	Male	74.6	Yes	73.2	Yes	72.5	Yes	83.0	Yes	76.2	Yes	74.5	Yes	75.7	Yes	75.4	Yes	77.8	Yes	75.5	−0.126	0.125	0.051	−0.016
	Female	73.8	No	74.5	No	76.9	No	73.9	No	73.8	No	73.0	No	73.3	No	73.1	No	74.0	No	72.3				
N. Ireland	Male	71.1	Yes	76.7	Yes	74.4	Yes	71.5	Yes	83.6*	Yes	77.4*	Yes	78.6*	Yes	81.5**	Yes	78.9*	Yes	74.3	0.084	0.103	0.010	0.032
	Female	76.3	No	72.8	No	65.8	No	74.0	No	72.5*	No	71.2*	No	71.4*	No	68.7**	No	71.0*	No	63.6				
Portugal	Male	77.1	Yes	77.0	Yes	76.5	Yes	77.6	Yes	78.3	Yes	76.2	Yes	76.8	Yes	78.4**	Yes	78.4	Yes	76.6	0.092	0.048	0.001	−0.017
	Female	76.3	No	76.4	No	73.1	No	76.3	No	76.2	No	78.3	No	74.8	No	74.6**	No	76.2	No	75.7				
Scotland	Male	73.4	Yes	72.9	Yes	73.4	Yes	77.0	Yes	78.5	Yes	74.1	Yes	76.4*	Yes	79.0**	Yes	78.7**	Yes	73.9	−0.027	0.064	0.134	0.020
	Female	72.9	No	73.2	No	68.9	No	72.2	No	71.8	No	69.5	No	70.3*	No	67.4**	No	68.4**	No	67.0				
Sweden	Male	63.1	Yes	67.5**	Yes	65.4**	Yes	69.2	Yes	67.6	Yes	65.9*	Yes	65.4	Yes	72.8**	Yes	n/a	Yes	67.0**	0.205**	0.068	0.031	0.022
	Female	62.9	No	61.9**	No	57.6**	No	62.6	No	62.4	No	61.6*	No	62.6	No	61.4**	No	62.7	No	61.6**				
Switzerland	Male	70.4*	Yes	74.5	Yes	73.5	Yes	73.2	Yes	82.1**	Yes	74.5*	Yes	74.1*	Yes	75.4**	Yes	77.8**	Yes	74.4**	0.071	0.085	0.050	0.113*
	Female	75.2*	No	73.0	No	61.2	No	73.3	No	70.9**	No	69.3*	No	67.8*	No	66.9**	No	71.3**	No	63.3**				
Wales	Male	72.3	Yes	72.3	Yes	71.5	Yes	68.9	Yes	69.3	Yes	72.8	Yes	72.4	Yes	71.6	Yes	70.1	Yes	71.6	−0.016	−0.127	−0.057	−0.0.20
	Female	70.8	No	71.5	No	69.7	No	71.6	No	72.0	No	69.6	No	71.1	No	71.2	No	71.9	No	70.5				

* Significant at 0.05 level

** Significant at 0.01 level

third of the maximum possible score in the respective domains (23.0, 31.5 and 26.2%, respectively). This could be explained by the fact that these activities tend to be more demanding and time-consuming. In addition, they would only be expected to be carried out if pharmacists were providing the full patient care aspects of pharmaceutical care [17]. Conversely, pharmacists scored higher on domains that related to more traditional areas of practice, such as verification of patient understanding (mean score, 73.8%) or patient record screening (mean score, 61.1%). Similar trends were observed within the instrumental dimension where responding pharmacists had their lowest mean scores in evaluation of patient satisfaction and performance evaluation subscales (49.6 and 47.1%, respectively).

Pharmacists with higher average daily prescription numbers in Ireland, Germany and Switzerland scored significantly higher in terms of their overall provision of pharmaceutical care. It is possible that more patient contact led to more consultation activities, documentation and patient record screening as suggested by the significant relationship between higher prescription turnover and increased direct patient care activities in these countries.

One possible criticism of the BPCS could be that too high a weight is given to documentation (30 out of 85 points for the direct patient care dimension) and that such documentation may be more prevalent in larger pharmacies with more sophisticated computer systems.

Even though some authors have suggested that a pharmacist's activity as a health care provider could be enhanced when prescription volume is low or when greater numbers of dispensing/support staff are employed, due to more time available for consultation activities [18], others have considered the ability to delegate and shift workload to other ancillary staff, as an overriding factor in determining the extent of pharmaceutical care provision [19]. The latter was supported, in part, by the fact that additional dispensing staff had a positive impact on pharmacists' scores for filled prescription validation in England, Scotland, Northern Ireland and Ireland compared to those who undertook the dispensing role themselves, but did not have a significant impact on patient consultation or pharmaceutical care provision as a whole.

In England and Ireland, pharmacists who were supported in their place of work by other pharmacists scored significantly higher on referral and consultation, which is a measure of collegial interaction, and had higher overall provision of pharmaceutical care. Lack of time, an important impediment to the provision of pharmaceutical care, could be overcome through employing additional pharmacists. However, employing and training extra staff requires an investment of both time and money. One solution is through reimbursement for services from third party payers. In Portugal, community pharmacists have recently obtained reimbursement for diabetes disease management [20]. In most of Europe, however, there is no consistent source of reimbursement for pharmacists' pharmaceutical care services [21]. An alternative option would be to implement and maintain health services within a financially viable business model. In the present study, participating in extra health services (such as patient monitoring, health screening, domiciliary visiting and health promotion/education) was significantly associated with improved provision of pharmaceutical care in several European countries.

In addition, another factor which may have an impact on the provision of pharmaceutical care in community pharmacy is the different pharmacy cultures and health service systems across different countries. Similar patterns of pharmaceutical care provision, as measured by the BPCS, are identifiable in areas with similar health care culture and systems; for example, Denmark and Sweden (Scandinavian countries in Northern Europe); Scotland, England and Northern Ireland (Western Europe); Malta and Portugal (Southern Europe); Germany and Switzerland (Central Europe).

One of the study limitations was the relatively low response rate in some countries (mainly Germany). However, the mean response rate across the different countries surveyed was around 40% which, in comparison with other published surveys of community pharmacy, can be considered a good response. In addition, a limited comparison of the demographics of respondents versus available published information on the demographics of the wider profession showed only minimal differences between respondents and overall profession demographics (data not shown).

One reason for the different response rates achieved in the present study may have been the use of different types of administration methods. In Germany for example, the questionnaire was sent only once in a regular mailing package of the association which could explain, in part, the lowest response rate achieved in that country. On the other hand, the highest response rate in the current study (71%) was achieved in Sweden where the questionnaire was transformed into a web-based version and members were invited to participate online.

Even though a lower response rate does not mean lower survey accuracy, it could introduce the possibility of bias in the data since those with a particular interest in the subject matter or the research itself are often more likely to return mailed questionnaires than those who are less interested [22]. For example, Portuguese respondents were quite young, therefore may have been more motivated to provide an enhanced pharmaceutical service. Only tentative conclusions were, therefore, derived from countries where the

proportion of responding pharmacies was less than 10% (e.g. Germany).

Due to the nature of the study, which was completely anonymous, it was not possible to contact non-respondents to carry out a non-respondent analysis. Anonymity was necessary to counteract the potentially strong social desirability bias which could otherwise have been introduced. A previous survey of pharmaceutical care provision in Danish pharmacies [12] has shown that 78% of non-respondents reported lack of time, lack of personnel or not participating in pharmaceutical care as reasons for not returning the questionnaire. Some of these reasons may also explain non-response to the present survey.

Conclusion

The present study attempted to measure the general provision of pharmaceutical care in community pharmacies across 13 European countries using a slightly modified version of the BPCS. The findings suggest that the provision of this type of service in a comprehensive fashion is still limited within Europe. Pharmacists routinely screened patient records, verified patient understanding and validated filled prescriptions but infrequently documented activities related to patient care, evaluated patients' perceived status, engaged in implementing therapeutic objectives and monitoring plans, evaluated patient satisfaction or self-evaluated their performance in providing pharmaceutical care on regular basis.

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