Self-reported clinical pharmacy service provision in Austria: an analysis of both the community and hospital pharmacy sector: a national study.

DEIBL, S., MUELLER, D., KIRCHDORFER, K., STEMER, G., HOPPEL, M. and WEIDMANN, A.E.

2020

Self-reported Clinical Pharmacy Service Provision in Austria: An analysis of both the Community and Hospital Pharmacy sector, a national study.

S Deibl[1], D Mueller[2], K Kirchdorfer[2], G Stemer[3], M Hoppel[1], AE Weidmann[4]

[1] Österreichische Apothekerkammer, Spitalgasse 31, Postfach 87, A-1091 Wien;

[2]Hanusch-Hospital, Vienna Pharmacy Department, Heinrich Collin-Straße 30, 1140 Vienna, Austria;

[3]Vienna General Hospital – Medical University Campus, Pharmacy Department, Währinger Gürtel 18-20, 1090 Wien, Vienna

[4]Robert Gordon University, School of Pharmacy and Life Sciences, Aberdeen UK,

Correspondence: Dr. Stefan Deibl, *Österreichische Apothekerkammer, Spitalgasse 31, Postfach 87, A-1091 Wien*.
Tel no: 01-40414-142, email: stefan.deibl@apothekerkammer.at

Abstract

Background With expansion of more advanced clinical roles for pharmacists we need to be mindful that the extent to which clinical pharmacy services (CPS) are implemented varies from one country to another. To date no comprehensive assessment of number and types of CPS provided by either community or hospital pharmacies in Austria exists.

Objective To analyse and describe the number and types of CPS provided in both community and hospital pharmacies, as well as the level of clinical pharmacy education of pharmacists across Austria.

Setting Austrian community and hospital pharmacies

Method An electronic questionnaire to determine number and types of CPS provided was issued to all chief pharmacists at all community (n=1365) and hospital pharmacies (n=40) across Austria. Besides current and future CPS provision, education and training provision were determined.

Main outcome measure Extent of and attitude towards CPS in Austria

Results Response rates to the surveys were 19.1% (n=261/1365) in community and 92.5% (n=37/40) in hospital pharmacies. 59.0% and 89.2% of community and hospital pharmacies, respectively, indicated that CPS provision has increased substantially in the past 10 years. 51.0% of community pharmacies reported to provide a medication review service, while 97.3% of hospitals provide a range of CPS. Only 18.0% of community pharmacies offer services other than medication review services at dispensing. Binary regressions show that provision of already established medication management is a predictor for the willingness of community pharmacists to extend the range of CPS ($p < 0.01$), while completed training in the area of clinical pharmacy is not ($p > 0.05$). More hospital than community pharmacists have postgraduate education in clinical pharmacy (17.4% vs 6.5%). A desire to complete postgraduate education was shown by 28.3% of community and 14.7% of hospital pharmacists. Lack of time, inadequate remuneration, lack of resources and poor relationship between pharmacists and physicians were highlighted as barriers.

Conclusion Both community and hospital pharmacists show strong willingness to expand their CPS provision and will need continued support, such as improved legislative structures, more supportive resources and practice focused training opportunities, to further these services.

Impacts on practice

- The current state of postgraduate training in clinical pharmacy and the pharmacists' willingness for further education in this area show that additional training possibilities need to be established to strengthen the provision of CPS in Austria.
- Although the findings of this survey suggest that the provision of CPS has been increased over the last years, there is still a significant lack of CPS in community pharmacies compared to other countries, such as the UK.
- Since only 15% of hospitals have a hospital pharmacy department, the pharmacy workforce needs to be dramatically increased, in order to offer CPS nationwide.
- Reimbursement is crucial to implement CPS nationwide. Political support is necessary to reach this requirement.

Introduction

In 2017 the newly elected Austrian government included provision of enhanced pharmaceutical care services into their government strategy for the very first time in history [1]. This is driving policy change which supports the provision of advanced clinical roles for pharmacists in practice.

The extent to which clinical pharmacy services (CPS) are implemented varies greatly from one country to another [2]. Especially in the USA, Canada, the United Kingdom and Australia, pharmaceutical care and CPS are well established compared to some European countries [3-6]. The benefits and positive patient outcomes associated with provision of CPS in both hospital and community pharmacies are well documented [7-17]. However, further evidence showing the value of CPS in the Austrian healthcare context is needed [18].

The annual report 2018, published by the Austrian Chamber of Pharmacists, lists over 1.360 community pharmacies and 40 hospital pharmacies (pharmacy department of veterinary hospital excluded), which implies that only about 15% of 269 hospitals have a hospital pharmacy department [19]. Community pharmacies in Austria are all privately owned, no pharmacy chains are allowed and remuneration is product-based. In the absence of reimbursement and a clear official mandate to provide CPS, the provision is self-motivated and down to the individual pharmacy to provide. The provision of more patient oriented CPS started about two decades ago. Today, CPS are largely part of the competences and responsibilities of Austrian hospital pharmacists [20]. In addition, pilot projects looking at providing CPS in community pharmacies have been ongoing**.** One example is the Pharmaceutical Safety Belt study, which took place in 71 community pharmacies in the federal state of Salzburg from 2007 to 2008 and looked at the prevention of adverse drug reactions, polypharmacy and the improvement of adherence [21]. This was the first project of its kind in Austria and it showed the need for CPS.

Most recently more than one third of all community pharmacies were registered as participating pharmacies in a Medication Management Project run by the Austrian Chamber of Pharmacists [22]. The project aimed to provide participants with basic skills to complete a medication review within the community pharmacy with support from an expert board of clinical pharmacists at the Chamber of Pharmacists in Austria. A second pilot project, the Multiprofessional Geriatric Medication Management (GEMED) study, saw the establishment of medication management in eleven care homes [23]. As delivery of CPS is not supported by a designated remuneration structure, the level of services provided vary greatly from one pharmacy to another. Aside from a multinational EAHP survey and a report commissioned by the Austrian Federal Ministry of Health including case studies on pharmaceutical care, there is only very limited data on the extent to which CPS are implemented across the Austrian hospital and community pharmacy sector [21, 24-26]. A recent article comparing the development of CPS in 12 countries suggested a low degree of implementation of these services in Austrian community pharmacies [6].

This study seeks to collect data about number and type of CPS in the community and hospital setting, aiding assessment of current state of implementation of these services and supporting decision-making on a professional and political level, to provide remuneration and to establish targeted clinical pharmacy training.

Aim of the study

The aim of this study was to analyse and describe the number and types of CPS provided in both community and hospital pharmacies, as well as the level of clinical pharmacy education of pharmacists across Austria.

Ethics approval

The School of Pharmacy and Life Sciences at Robert Gordon University Aberdeen and the ethics board of the city of Vienna advised that this study did not require formal review by an ethics committee.

Methods

Two pilot questionnaires (community/hospital pharmacy) were designed in accordance with published best practice and current scientific work conducted by the European Association of Hospital Pharmacists (EAHP) (Table 1; Appendix) [26, 27]. The questionnaires were reviewed for face and content validity by six research experienced hospital and eight community pharmacists across different federal states in Austria. The questionnaires were piloted in around 10% (community n=138; hospital n=6) of the final sample size and adjustments were made. The questionnaire contained five sections with a mixture of open and closed questions. Sections on background information, education and training, current and future provision of CPS, as well as an open question for pharmacists to voice their professional opinion were included (Table 1). In April 2018, the Austrian Chamber of Pharmacists sent the final online questionnaire survey to all community (n=1365) and hospital (n=40) pharmacies across Austria, asking chief pharmacists for completion. Two reminders were sent at four-weekly intervals, published via the Austrian Pharmaceutical Journal and their online bulletin board. Data was coded and entered into SPSS for Windows vs. 21 (SPSS Inc.) and analysed using descriptive statistics, binary regression analysis ($p < 0.05$) and non-parametric statistical tests where appropriate (Kruskal-Wallis test). Content analysis was performed on the responses to open questions relating to personal opinions and experiences with provision of CPS [28]. Key themes are described using illustrative quotes with each respondent assigned a number.

Results

The responses of 261 community pharmacies (19.1% response rate; n=261/1365) and 37 hospital pharmacies (92.5% response rate; n=37/40) were included in this analysis. Demographic data are given in Table 2.

Community Pharmacies

Current provision of CPS

A medication review service is the most frequently provided CPS in community pharmacy according to respondents (Table 3). Answers to open questions show that many community pharmacies implemented medication review services after completion of the continuous professional development (CPD) course on

medication reviews offered by the Austrian Chamber of Pharmacists. *"We started offering medication reviews after successful completion of the courses" [P037].* They see continued need for medication review services going forward. *"Remunerated medication reviews in all patients with polypharmacy"[P017]; "medication reviews over the counter" [P034]; Medication reviews for nursing homes and sheltered housing units [….]" [P083].* Remuneration, time, working relationship with physicians and appropriate computer software are seen as biggest barriers to successful continuation and extension of medication review services. *"To support medication review services we need a useful free of charge database for all pharmacies" [P074].*

Only 18% (n=47) of participating community pharmacies offer other clinical services (Table 3). The respondents provided a diverse list of additional service(s) including "*Filling compliance aids [P048]"; "Screening HbA1c, blood pressure, cholesterol [P135]"; "Interpretation of and counselling on the basis of pharmacogenetic analysis [P065]" and "Nursing home support for medication related questions [P115]".* 59.0% (n=154) of respondents confirmed having extended CPS in the past 10 years largely being a result of CPD-programs offered by the Austrian Chamber of Pharmacists (Table 3). 26.8% (n=70) of participating pharmacies state that they document CPS routinely (Table 3). Most of them document in paper form (n=59).

Future provision of CPS

More than two-thirds of respondents (69.0%; n=180) show a desire to extend the range of CPS (Table 3). Binary regression analysis shows that this is independent of age ($p > 0.05$) or number of pharmacists working within a community pharmacy ($p > 0.05$). Completion of a postgraduate degree or CPD-programme is also not a predictor for the willingness to extend CPS ($p > 0.05$). Community pharmacists who have an already established medication management service are most willing to extend their range of services ($p < 0.01$). In addition, statistical contingency tables indicate that community pharmacists who have already extended CPS are not only more willing to extend these further but would like a more professional relationship with physicians. *"Closer working relationships with physicians (to show our breadth of competence) [P031]".* One pharmacist even considers that "*[…] a clinical pharmacist could become a job title in its own right, they would work independently running their own clinic" [P195].*

Clinical Pharmacy education and training

9.1% (n=94) of pharmacists have successfully completed or are in the process of completing a postgraduate degree or CPD-programme in clinical pharmacy (Table 4). 28.3% (n=294) of community pharmacists have a desire to complete such a postgraduate education in the future (Table 4). Open responses show that Austrian community pharmacists would welcome a much wider range of education and training programmes for qualified pharmacists *"more education programmes for Austrian pharmacists please" [P042]; "postgraduate degrees and PgCertificate programmes" [P073].* It is of special interest to respondents that the level of education is appropriate *"Education programmes should be building on each other not offer a simple repeat, foster networking […]" [P006]* and that clinical pharmacy is seen as a key competency for all pharmacists. *"Clinical pharmacy = key competence of every pharmacist, instead of offering additional programmes we need to highlight that everyone who has obtained his/her license is (or should) also be qualified as a clinical pharmacist" [P006].* Suggestions for the future include mandatory continuing professional development and introducing concepts of clinical

pharmacy in the undergraduate curriculum. The willingness to complete an additional postgraduate education programme is independent of age ($p > 0.05$; Kruskal-Wallis test).

Hospital Pharmacies

Current provision of CPS

As reported by participating hospital pharmacists, CPS have been extended in the past 10 years in almost all participating hospitals (89.2%; n=33) (Table 5) with 97.3% (n=36) providing a CPS (Table 5). Participating hospital pharmacies have a workforce of 340 pharmacists or 300 full-time equivalents (FTE). Currently, only 14% (n=42 FTE) of the pharmacist-workforce is used to deliver CPS services routinely.

The two most commonly provided services are ward-based CPS (83.8%; n= 31) and/or the provision of a dedicated medicines information service to other healthcare professionals (54.1%; n=20). The ward pharmacist services are mainly delivered daily (32.4%; n=12) or weekly (43.2%; n=16) with orthopaedics, surgery, geriatrics and internal medicine the most frequently covered clinical specialties (Table 5). Most of CPS are offered at the point of patient admission (43.2%; n=16) focusing on medication review (40.5%; n=15) and reconciliation (35.1%; n=13). Only 8.1% (n=3) of the hospitals also offer CPS at the point of discharge (Table 5).

The value of these services is widely acknowledged by the respondents and they express a strong wish for extension. *"Extension of existing CPS to more departments; shifting focus from "passive" activities (we visit the ward and deliver a service) to handling of more active inquiries (focused medication reviews) or needs (screening of selected medication histories on admission)" [P039].* As reported by participating hospital pharmacists, the interest in extension of ward-based CPS is supported by both physicians and nurses (86.5%; n=32who would welcome the extension of multidisciplinary team meetings, ward rounds, admission and discharge services as well as medication reviews for inpatients. This would however require a considerable investment in staff resources (*"If we had more staff we could do much more" [P043])*. Other than lack of staff, lack of adequate training, electronic patient records and legislative structures were seen as main barriers to extend CPS.

89.2% (n=33) of all participating hospital pharmacies state that they document all or almost all of their suggested clinical interventions routinely. 62.2% (n=23) use a validated classification system for the documentation of all or almost all of their clinical pharmacists' interventions. In most cases this is based on the French society for clinical pharmacy tool (29.7%; n=11) (Table 5) [29].

Future provision of CPS

Almost all respondents (94.6%; n=35) show desire for extension of CPS (Table 5). In addition to suggested extension opportunities for clinical admission-/discharge services and specialist ward-based pharmacy input, participants suggest improved legislative structures, more supportive resources and practice focused training opportunities. *"Legislative structures, without them an extension of services will be very difficult" [P005]; "Increase in staff resources (it is no longer possible to achieve this using rationalisation strategies); Software support; integration of systems would be useful" [P028]; "Undergraduate curriculum has to become more practice focused. Rotation in hospital; Placements in other hospitals; more postgraduate opportunities" [P029].*

Clinical pharmacy education and training

More than half of all pharmacists in participating hospitals have or are in the process of completing a postgraduate specialisation in hospital pharmacy practice (66.5%; n=226) (Table 4). 18.8% (n=64) pharmacists either have or are in the process of obtaining a postgraduate degree in clinical pharmacy practice (Table 4). In addition, 14.7% (n=50) of pharmacists are interested in completing such a qualification in the future. Open questions reflect a desire for better integration of clinical pharmacy into the undergraduate curriculum including placement opportunities. *„Better integration into the curriculum, clinical topics"[P024]*.

Discussion

To our knowledge this is the first large national study reporting number and types of CPS provided in community and hospital pharmacies across Austria. In general, the provision of CPS across both sectors has expanded over the past 10 years and there is desire for further expansion. Focus of these services is mainly centred on medication reviews and medication management in both settings. While lack of adequate training was a concern of both sectors, community and hospital pharmacists named different barriers towards implementation and extension of CPS. Community pharmacists highlighted lack of time, inadequate remuneration, lack of resources and an often-poor relationship between pharmacists and physicians as main barriers to implementation of CPS. In hospital pharmacies, lack of staff was named as main barrier with additional identified barriers such as lack of electronic patient records and legislative structures. Besides CPS, Austrian hospital pharmacists are responsible for other tasks, such as strategic procurement, logistics, sterile/non-sterile production and compounding [30].

The majority of participating community pharmacists indicated that CPS have been extended over the past decade with a particular emphasis on implementation of medication reviews. Martins et al. reported that two-thirds of European countries offered pharmaceutical care programmes with medication reviews as an integral part [31]. Our findings place Austria in line with other European countries. While the study looked at establishing the types of services available in community pharmacy across 27 European countries, using a quantitative survey methodology, Austria was not included in the analysis and therefore care needs to be taken when extrapolating the findings [31]. Still this is an encouraging result and highlights that training provided by the Austrian Chamber of Pharmacists has been supportive to implement review services which have increased in prevalence over the past decade.

Participants in this study expressed a desire to complete postgraduate education in the future. The fact that willingness to extend CPS was dependent on already implemented medication management services but not on completed training, shows that creation of an environment in which pharmacists can perform clinical tasks is vital.

Previous research showed a statistically significant correlation between lack of skill to perform medication assessments and lack of vision on professional development [32]. As pharmacists' education has been identified as a key barrier to implementation of CPS, it is very encouraging that Austrian pharmacists understand the need to acquire the necessary skillset to progress CPS offered [32].

As known from an Austrian pilot-project, where up to one third of all community pharmacies participated, the number of medication reviews performed by each pharmacy was mostly in the single-digit range [22]. Density of

medication review services carried out in pharmacies thus still lags significantly behind countries such as the UK [33]. However, this is not surprising as regulatory change and implementation of reimbursed medication reviews as a mandatory element in the community pharmacy contract assisted in increasing CPS in the UK [34].

In contrast to community pharmacies, this study identified that almost all Austrian hospital pharmacies provide CPS to various degrees of implementation. A comparison of the findings with the EAHP surveys [24-26] shows that the number of CPS carried out on admission increased (2010: 17.1%; 2018: 43.2%) while the number at discharge stayed nearly unchanged (2010: 8.6%; 2018: 8.1%). The percentage of hospital pharmacies documenting clinical activities has increased with the majority of hospitals using a validated classification system such as adapted versions of the French Society of Clinical Pharmacy tool [29]. This documentation allows drug-related problems and suggested interventions to be tracked and analysed, ultimately allowing assessment of the pharmacists' contribution to patient care.

Barriers to implementation of pharmaceutical care are well documented around the world [2, 35-39]. Lack of financial resources, time, software support, education, staff and the healthcare structure itself have been identified as key barriers for many years [35]. While results from this study echo these global concerns, physician's attitude was seen as a main barrier in community pharmacies, whereas hospital pharmacists claimed that hospital-based physicians would support the extension of CPS. This disparity may be attributed to experiences with interdisciplinary working in hospitals, compared to the more insular working environment in the community setting. Studies have shown that pharmacists need to establish trustworthiness and clarification of their clinical roles to build a collaborative working relationship with medical healthcare professionals. As benefits of pharmacists' involvement become more apparent to medical healthcare professionals, closer working relationships are likely to develop [40, 41]. In Austria, more resources need to be invested in supporting pharmacists to work in multidisciplinary environments both within the hospital and community practice setting to ensure long-term success of CPS.

The results of our study emphasise both the willingness of the pharmacists and the need for further implementation of CPS across Austria. Findings presented, clearly show progress in provision of CPS across Austria over the last decade. Dedicated support and implementation of structures should allow continuous and sustainable development of these services in hospital and community pharmacies.

Further research is necessary to explore facilitators and barriers towards implementation of CPS across both sectors, in order to implement a framework for CPS. Evaluating all documented CPS and the establishment of quality assurance measures would be beneficial to show and guarantee the impact CPS are having on patient care across Austria.

To our knowledge this is the first national study of its kind in Austria. The study provides data regarding state of implementation of CPS, which is important for political process and to support implementation of CPS through adequate remuneration. Due to the good response rate, especially for hospital pharmacies, reliability of the results can be assumed.

However, the study has its limitations. The self-reported nature of the questionnaire does not allow verification of the responses. As the survey was answered by the manager or an authorised pharmacist, the opinion of employees might differ from received answers. The response rate of community pharmacies was low compared to hospital

pharmacies. It might be reasonably assumed that pharmacies with a positive attitude towards clinical pharmacy were more likely to participate in the survey, thus causing social desirability bias. Differences in perception and definition of the term "clinical pharmacy" might be a further limitation of the study. This could either lead to over- or underestimation, as services might not be recognized or mistakenly identified as such. Another limitation is that only hospitals with a hospital pharmacy department were used as a reference for the hospital pharmacy sector. However, due to the current situation in Austria, only hospitals with a hospital pharmacy department offer a realistic potential for implementation of CPS.

Conclusion

This self-reported survey shows that CPS provision in Austria has been on the rise over the past decade and pharmacists are eager to continue their implementation across both community and hospital pharmacy sector. Support is needed to overcome identified barriers and provide a sustainable implementation structure alongside a range of postgraduate education opportunities. Pharmacists across Austria are setting a clear signal that they consider CPS to be a key aspect of their professional role in the future.

Funding

No special funding was obtained.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Austrian Federal Government. Zusammen. Für unser Österreich. Regierungsprogramm 2017-2022. 2017. https://www.bundeskanzleramt.gv.at/documents/131008/569203/Regierungsprogramm_2017–2022.pdf/b2fe3f65-5a04-47b6-913d-2fe512ff4ce6. Accessed 17 Dec 2018.
2. LeBlanc JM, Seoane-Vazquez E, Dasta JF. Survey of hospital pharmacist activities outside of the United States. Am J Health Syst Pharm. 2007;64(16):1748-55.
3. Gums J, Changing the Direction of Clinical Pharmacy Outside the United States: Time to Step Up. Pharmacother. 2013; 33(2):122–5.
4. Bulajeva A, Labberton L, Leikola S, Pohjanoksa-Mäntylä M, Geurts MME, de Gier JJ, Airaksinen M. Medication review practices in European countries. Res Social Adm Pharm. 2014;10:731-740.
5. Canadian Pharmacists Association. A Review of Pharmacy Services in Canada and the Health and Economic Evidence. 2016. https://www.pharmacists.ca/cpha-ca/assets/File/cpha-on-the-issues/Pharmacy%20Services%20Report%201.pdf. Accessed 06 Oct 2018
6. Rose O, Derendorf H, Erzkamp S, Fujita K, Hartl A, Hoti K, Krass I, Obarcanin E, Saevels J, Srimongkon P, Teichert M, Tsuyuki RT. Development of clinical pharmacy services in Australia, Austria, Belgium, Bosnia Herzegovina, Canada, Germany, Japan, Kosovo, Switzerland, the Netherlands, Thailand, USA and correlation with educational standards, level of research, and implementation practices. Int J Clin Pharmacol Ther. 2018. https://doi.org/10.5414/CP203264
7. Bladh L, Ottosson E, Karlsson J, Klintberg L, Wallerstedt SM. Effects of a clinical pharmacist service on health-related quality of life and prescribing of drugs: a randomised controlled trial. BMJ Qual & Saf. 2011;20(9):738-46.

8. Bond CA, Raehl CL. 2006 national clinical pharmacy services survey: clinical pharmacy services, collaborative drug management, medication errors, and pharmacy technology. Pharmacother. 2008;28(1):1-13.
9. Bunting B, Cranor CW. The Asheville Project: long-term clinical, humanistic, and economic outcomes of a community-based medication therapy management program for asthma. J Am Pharm Assoc. 2006;46(2):133-47.
10. Bunting BA, Smith BH, Sutherland SE. The Asheville Project: clinical and economic outcomes of a community-based long-term medication therapy management program for hypertension and dyslipidemia. J Am Pharm Assoc. 2008;48(1):23-31.
11. Cranor CW, Bunting BA, Christensen DB. The Asheville Project: long-term clinical and economic outcomes of a community pharmacy diabetes care program. J Am Pharm Assoc. 2003;43(2):173-84.
12. Christensen M, Lundh A. Medication review in hospitalised patients to reduce morbidity and mortality. The Cochrane Database Of Systematic Reviews. 2016; https://doi.org//10.1002/14651858.CD008986.pub3
13. Nkansah N, Mostovetsky O, Yu C, Chheng T, Beney J, Bond CM, Bero L. Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. The Cochrane Database Of Systematic Reviews. 2010; https://doi.org//10.1002/14651858.CD000336.pub2
14. Santschi, V, Chiolero A, Colosimo AL, Platt RW, Taffé P, Burnier M, Burnand B, Paradis G. Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized controlled trials. J Am Heart Assoc. 2014; https://doi.org//10.1161/JAHA.113.000718
15. Westerlund T, Marklund B. Assessment of the clinical and economic outcomes of pharmacy interventions in drug-related problems. J Clin Pharm Ther. 2009;34(3):319-27.
16. Hadi MA, Alldred DP, Briggs M, Munyombwe T, Closs SJ. Effectiveness of pharmacist-led medication review in chronic pain management: systematic review and meta-analysis. Clin J Pain. 2014;30(11):1006-14.
17. Lee JK, Grace KA, Taylor AJ. Effect of a pharmacy care program on medication adherence and persistence, blood pressure, and low-density lipoprotein cholesterol: a randomized controlled trial. JAMA, 2006;296(21):2563-71.
18. Stemer G, Laml-Wallner G, Kuegler I, Poelzleitner P, Messner S, Steininger S, Dolinar E, Zehetmayer S. Comprehensive evaluation of clinical pharmacists' interventions in a large Austrian tertiary care hospital. Eur J Hosp Pharm: Sci Pract. 2012;19:529-34.
19. Austrian Chamber Of Pharmacists. *Apotheke in Zahlen 2018*. Vienna (Austria): Österreichische Apothekerkammer; 2018.
20. Langer T, Spreitzer H, Ditfurth T, Stemer G, Atkinson J. Pharmacy Practice and Education in Austria. Pharmacy. 2018; https://doi.org//10.3390/pharmacy6030055
21. Morak S, Vogler S, Walser S, Kijlstra N. Understanding the pharmaceutical care concept and applying it in practice. Vienna (Austria): Austrian Federal Ministry of Health; 2010.
22. Austrian Chamber Of Pharmacists. Medikamente im Griff. 2017. https://www.apotheker.or.at/Internet/OEAK/newspresse.nsf/webPages/9EB7B28C7318AD5FC125806700296957?OpenDocument. Accessed 17 Dec 2018.
23. Strasser D, Kretschmer E. GEMED Mulitprofessionelles Geriatrisches Medikationsmanagement in stationären Alteneinrichtungen. 2018. http://www.gemed.at/index.php/home. Accessed 17 Dec 2018.
24. Frontini, R, Miharija-Gala T, Sykora J. EAHP Survey 2010 on hospital pharmacy in Europe: Part 1. General frame and staffing. Eur J Hosp Pharm. 2012;19:385–387.
25. Frontini, R, Miharija-Gala T, Sykora J. EAHP Survey 2010 on hospital pharmacy in Europe: parts 4 and 5. Clinical services and patient safety. Eur J Hosp Pharm. 2013;20:69-73.
26. EAHP. European Statements of Hospital Pharmacy Survey Results 2016. 2017. http://www.eahp.eu/publications/survey/content/2018-statements-survey. Accessed 08 Oct 2018.
27. EAHP. European Hospital Pharmacy Survey 2010. 2010. http://www.eahp.eu/publications/survey/eahp-2010-survey-hospital-pharmacy-practice-europe. Accessed 17 Dec 2018.
28. Hsieh, HE, Shannon, SE. Three Approaches to qualitative content analysis. Qual Health Res. 2005. 15(9):1277-88.
29. Allenet B, Bedouch P, Rose FX, Escofier L, Roubille R, Charpiat B, Juste M, Conort O. Validation of an instrument for the documentation of clinical pharmacists' interventions. Pharm World Sci. 2006;28(4):181-8.

30. The Austrian Association of Hospital Pharmacists and Austrian Society of Hospital Pharmacy. Mission Statement. 2018. https://www.aahp.at/images/stories/Aktuelles/2018/Mission-Statement-2018-bunt.pdf Accessed 12 Jun 2019.
31. Martins SF, van Mil JWF, da Costa FA. The organizational framework of community pharmacies in Europe. Int J Clin Pharm. 2015;37:896–905.
32. van Mil JWf, de Boer WO, Tromp THFJ. European barriers to the implementation of pharmaceutical care. Int J Clin Pharm. 2001;9:163-168.
33. NHS England. Improving health and patient care through community pharmacy – Evidence resource pack. 2013. http://nellpc.org.uk/wp-content/uploads/2013/10/comm-pharmacy-resource.pdf. Accessed 09 Feb 2019.
34. Scottish Government. Pharmacy. 2018. https://www2.gov.scot/Topics/Health/NHS-Workforce/Pharmacists/Pharmacy. Accessed 12 Feb 2019.
35. Hossain LN, Fernandez-Llimos F, Luckett T, Moullin JC, Durks D, Franco-Trigo L, Benrimoj SI, Sabater-Hernández1 D. 2017. Qualitative meta-synthesis of barriers and facilitators that influence the implementation of community pharmacy services: perspectives of patients, nurses and general medical practitioners. BMJ Open. 2017; https://doi.org//10.1136/bmjopen-2016-015471
36. Marquis J, Schneider MP, Spencer B, Bugnon O, Du Pasquier S. Exploring the implementation of a medication adherence programme by community pharmacists: a qualitative study. Int J Clin Pharm. 2014;36(5):1014-22.
37. Niquille A, Lattmann C, Bugnon O. Medication reviews led by community pharmacists in Switzerland: a qualitative survey to evaluate barriers and facilitators. Pharm Pract. 2010;8(1):35-42.
38. Berbatis CG, Sunderland VB, Joyce A, Bulsara M, Mills C. Enhanced pharmacy services, barriers and facilitators in Australia's community pharmacies: Australia's National Pharmacy Database Project. Int J Pharm Pract. 2007;15:185–91.
39. American College Of Clinical Pharmacy Clinical Practice Affairs Committee. Clinical pharmacy practice in the noninstitutional setting. A white paper from the American College of Clinical Pharmacy. Pharmacother. 1992;12(4):358-64.
40. Doucette WR, Nevis J, Randal C, McDonough PR. Factor affecting collaborative care between pharmacists and physicians. Pharm. 2005;1(4):565-578.
41. McDonough RP, Doucette WR. Developing Collaborative working relationships between Pharmacists and Physicians. J Am Pharm Assoc. 2001;41(55):682-92.

405 **Tables and Figures**

406 **Table 1** Overview and structure of the questionnaire which was sent to community and hospital pharmacies in
407 Austria.
408

Section	Question topics included
Background Information	• Federal state • Job role of participant • Number of pharmacists in each pharmacy • Average age of all employed pharmacists
Education and Training	• Number and type of education and training completed: specialist postgraduate programmes continuous professional development (CPD) programmes in clinical and/ or hospital pharmacy • Number and type of pharmacists interested in such an education
Current provision of clinical pharmacy services	• Medication reviews • Number and type of other services offered • Documentation type and frequency
Future provision of clinical pharmacy services	• Desire • Feasibility • Types of services anticipated
Open question	• Professional opinion and experiences with the provision of clinical pharmacy services

409

410

411 **Table 2** Demographic data from 261 community pharmacies and from 37 hospital pharmacy respondents across
412 Austria.

Frequencies		**Community pharmacies (n=261) n (%)**	**Hospital pharmacies (n = 37) n (%)**
Federal state	Burgenland	6 (2.3)	2 (5.4)
	Niederösterreich	43(16.5)	3 (8.1)
	Kärnten	15(5.7)	3 (8.1)
	Oberösterreich	53 (20.3)	10 (27)
	Salzburg	16 (6.1)	1 (2.7)
	Steiermark	36 (13.8)	5(13.5)
	Tirol	22 (8.4)	1 (2.7)
	Vorarlberg	19 (7.3)	1 (2.7)
	Wien	50 (19.2)	11 (29.7)
	No response	1 (0.4)	0 (0.0)
Role of Participant	Manager (Pharmacy)	260 (99.6)	27 (73)
	Employee Pharmacist	0 (0)	10 (27)
	No response	1 (0.4)	0 (0.0)
Number of Pharmacists per Pharmacy	1	4 (1.5)	0 (0)
	2	29 (11.1)	2 (5.4)
	3	80 (30.7)	5 (13.5)
	4	76 (29.1)	2 (5.4)
	5	38 (14.6)	1 (2.7)
	6	9 (3.4)	2 (5.4)
	7	10 (3.8)	3 (8.1)
	8	4 (1.5)	5 (13.5)
	9	1 (0.4)	3 (8.1)
	10	2 (0.8)	3 (8.1)
	> 10	4 (1.5)	10 (27.0)
	No response	4 (1.5)	1 (2.7)

413

414

Table 3 Responses on the provision of clinical pharmacy services from 261 community pharmacy respondents across Austria.

Provision of clinical pharmacy services in community pharmacies			
Questions	**Community pharmacies (n=261)** **n (%)**		**No response n (%)**
Are you providing medication reviews as part of a medication management program at your pharmacy	Yes	133 (51.0)	30 (11.5)
	No	98 (37.5)	
Are there any other clinical pharmacy services provided (going beyond drug information on a daily basis) in your pharmacy?	Yes	47 (18.0)	43 (16.5)
	No	171 (65.5)	
Are clinical pharmacy services documented?	Yes	70 (26.8)	37 (14.2)
	No	154 (59.0)	
What kind of documentation do you use? (multiple selection possible)	Electronic patient record	15 (5.7)	
	Other electronic documentation	12 (4.6)	
	Paper form	59 (22.6)	
	Not applicable	93 (35.6)	
Have the clinical pharmacy services been expanded compared to 10 years ago?	Yes	154 (59.0)	38 (14.6)
	No	69 (26.4)	
Are you interested in expanding clinical pharmacy services?	Yes	180 (69.0)	48 (18.4)
	No	33 (12.6)	

Table 4: Responses on education from 261 community pharmacy (= 1038 pharmacists in total) and from 37 hospital pharmacy (= 340 pharmacists in total) respondents across Austria.

Education						
Questions	**Community pharmacists (n=1038) n (%)**		**No response n (%)**	**Hospital pharmacists (n=340) n (%)**		**No response n (%)**
How many pharmacists have completed training / further education in the field of clinical pharmacy (postgraduate studies, certificate courses lasting several weeks ...)?	Postgraduate studies	17 (1.6)	248 (23.9)	Postgraduate studies	13 (3.8)	3 (0.9)
	Certificate course	39 (3.8)		Certificate course	42 (12.4)	
	Other	11 (1.1)		Other	4 (1.2)	
How many pharmacists are currently undergoing such training / further training?	Postgraduate studies	15 (1.4)		Postgraduate studies	4 (1.2)	
	Certificate course	5 (0.5)		Certificate course	1 (0.3)	
	Other	7 (0.7)		Other	0 (0.0)	
How many pharmacists are interested in future postgraduate training?	Postgraduate studies	105 (10.1)		Postgraduate studies	22 (6.5)	
	Certificate course	135 (13.0)		Certificate course	23 (6.8)	
	Other	54 (5.2)		Other	5 (1.5)	
How many pharmacists have or are currently undergoing a postgraduate specialisation in hospital pharmacy practice?	-	-	-	Already completed	157 (46.2)	22 (6.5)
	-	-		Currently undergoing	69 (20.3)	

425 **Table 5** Responses on the provision of clinical pharmacy services from 37 hospital pharmacy respondents
426 across Austria.

Provision of clinical pharmacy services in hospital pharmacies			
Questions	**Hospital pharmacies (n=37)** **n (%)**		**No response n (%)**
Are pharmacists providing clinical pharmacy services at your hospital?	Yes	36 (97.3)	1 (2.7)
	No	0 (0.0)	
Are the clinical pharmacy services delivered ward-based?	Yes	31 (83.8)	1 (2.7)
	No	5 (13.5)	
How often are (ward-based) clinical pharmacy services delivered?	Daily	12 (32.4)	
	Weekly	16 (43.2)	
	Fortnightly	2 (5.4)	
	Monthly	1 (2.7)	
	Other	4 (10.8)	
	Not applicable	1 (2.7)	
Does your pharmacy offer a dedicated medicines information service?	Yes	20 (54.1)	2 (5.4)
	No	15 (40.5)	
Are clinical pharmacy services offered at the point of admission?	Yes	16 (43.2)	2 (5.4)
	No	19 (51.4)	
Which clinical pharmacy services are provided at the point of admission? (multiple selection possible)	Medicines reconciliation	13 (35.1)	
	Medication review	15 (40.5)	
	Other	6 (16.2)	
Are clinical pharmacy services offered at the point of discharge?	Yes	3 (8.1)	2 (5.4)
	No	32 (86.5)	
Are clinical pharmacy services documented?	All	26 (70.3)	2 (5.4)
	Almost	7 (18.9)	
	Partially	1 (2.7)	
	Infrequently	0 (0.0)	
	Never	1 (2.7)	
	Not applicable	0 (0.0)	
Do you use a validated classification system?	All	14 (37.8)	
	Almost	9 (24.3)	
	Partially	4 (10.8)	
	Infrequently	0 (0.0)	
	Never	0 (0.0)	
	Not applicable	8 (21.6)	
Which kind of classification system do you use?	Based on French Society of Clinical Pharmacy Tool	11 (29.7)	
	Based on PCNE	1 (2.7)	
	Other	16 (43.2)	
	None	7 (18.9)	
Have the clinical pharmacy services been expanded	Yes	33 (89.2)	2 (5.4)
	No	2 (5.4)	

compared to 10 years ago?			
Are you interested in expanding clinical pharmacy services?	Yes	35 (94.6)	2 (5.4)
	No	0 (0.0)	
Is there interest of physicians/nurses to expand clinical pharmacy services?	Yes	32 (86.5)	3 (8.1)
	No	2 (5.4)	

427

Appendix

Questionnaire Overview. Hospital pharmacies reported number of pharmacists in total and full-time equivalents (FTE).

General Questions		
	Please select the federal state	
	Please select the position of the participating pharmacist	Pharmacy manager
		Employed pharmacist
	How many pharmacists (including the pharmacy manager) work in your pharmacy?	Number
	Please provide the number of pharmacists per age group	<30 years
		30-40 years
		40-50 years
		>50 years
Training and Education		
	How many pharmacists have a completed training in the area of clinical pharmacy (e.g. postgraduate studies, certificate course…)?	Postgraduate studies
		Certificate course
		Other
	How many pharmacists are currently undergoing training in the area of clinical pharmacy?	Postgraduate studies
		Certificate course
		Other
	How many pharmacists are interested in postgraduate training in the area of clinical pharmacy?	Postgraduate studies
		Certificate course
		Other
	Hospital pharmacy section: How many pharmacists have a postgraduate specialisation in hospital pharmacy practice?	Number
	Hospital pharmacy section: How many pharmacists are currently undergoing a postgraduate specialisation in hospital pharmacy practice?	Number
Clinical pharmacy services		
	Community pharmacy section: Are you providing medication reviews as part of a medication management program at your pharmacy?	Yes/No
	Community pharmacy section: Are there any other clinical pharmacy services provided (going beyond drug information on a daily basis) in your pharmacy?	Yes/No

Community pharmacy section: Which kind of other clinical pharmacy services are provided?	Free text
Hospital pharmacy section: Are pharmacists providing clinical pharmacy services at your hospital?	Yes/No
Hospital pharmacy section: How many FTE of the overall pharmacist workforce are used to deliver clinical pharmacy services?	Number
Hospital pharmacy section: Are the clinical pharmacy services delivered ward-based?	Yes/No Frequency: Daily/Weekly/Fortnightly/Monthly/Other/None Which clinical specialities are covered?
Hospital pharmacy section: Are clinical pharmacy services offered at the point of admission?	Yes/No Which services are provided? Medicines reconciliation/Medication review/Other
Hospital pharmacy section: Are clinical pharmacy services offered at the point of discharge?	Yes/No
Hospital pharmacy section: Does your pharmacy offer a dedicated medicines information service?	Yes/No
Documentation	
Are clinical pharmacy services documented?	*Community pharmacy section:* Yes/No Electronic patient record/Other electronic documentation/Paper form/Not applicable *Hospital pharmacy section:* All/Almost all/Partially/Infrequently/Never Use of a validated classification system: All/Almost all/Partially/Infrequently/Never Which kind of classification system is used: Based on French Society of Clinical Pharmacy Tool/Based on PCNE/Other/None
Review and outlook	
Have clinical pharmacy services been extended over the past 10 years?	Yes/No Which kind of extension was made?
Are you interested in expanding clinical pharmacy services?	Yes/No *Hospital pharmacy section:* Interest from pharmacists/physicians and nurses?
Further ideas regarding clinical pharmacy	

Further ideas regarding clinical pharmacy?	