

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. *International journal of clinical pharmacy* [online], 42(4), pages 1050-1060. Available from: <https://doi.org/10.1007/s11096-020-01066-5>

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

This is a post-peer-review, pre-copyedited version of an article published in *International Journal of Clinical Pharmacy*. The final authenticated version is available online at: <https://doi.org/10.1007/s11096-020-01066-5>. This pre-copyedited version is made available under the Springer terms of reuse for AAMs: <https://www.springer.com/gp/open-access/publication-policies/aam-terms-of-use>.

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

3 S Deibl¹, D Mueller², K Kirchdorfer², G Stemer³, M Hoppel¹, AE Weidmann⁴

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

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

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

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

9

10

11 Correspondence: Dr. Stefan Deibl, *Österreichische Apothekerkammer, Spitalgasse 31, Postfach 87, A-1091 Wien.*

12 Tel no: 01-40414-142, email: stefan.deibl@apothekerkammer.at

13

14

15

16

17

18

19

20 **Abstract**

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

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

27 *Setting* Austrian community and hospital pharmacies

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

31 *Main outcome measure* Extent of and attitude towards CPS in Austria

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

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

46

47 *Impacts on practice*

48 • The current state of postgraduate training in clinical pharmacy and the pharmacists' willingness for further
49 education in this area show that additional training possibilities need to be established to strengthen the provision
50 of CPS in Austria.

51 • Although the findings of this survey suggest that the provision of CPS has been increased over the last years,
52 there is still a significant lack of CPS in community pharmacies compared to other countries, such as the UK.

53 • Since only 15% of hospitals have a hospital pharmacy department, the pharmacy workforce needs to be
54 dramatically increased, in order to offer CPS nationwide.

55 • Reimbursement is crucial to implement CPS nationwide. Political support is necessary to reach this requirement.

56

57 **Introduction**

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

61 The extent to which clinical pharmacy services (CPS) are implemented varies greatly from one country to another
62 [2]. Especially in the USA, Canada, the United Kingdom and Australia, pharmaceutical care and CPS are well
63 established compared to some European countries [3-6]. The benefits and positive patient outcomes associated
64 with provision of CPS in both hospital and community pharmacies are well documented [7-17]. However, further
65 evidence showing the value of CPS in the Austrian healthcare context is needed [18].

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

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

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

92

93

94 **Aim of the study**

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

97

98 **Ethics approval**

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

101

102 **Methods**

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

118

119 **Results**

120 The responses of 261 community pharmacies (19.1% response rate; n=261/1365) and 37 hospital pharmacies
121 (92.5% response rate; n=37/40) were included in this analysis. Demographic data are given in Table 2.

122

123 **Community Pharmacies**

124 *Current provision of CPS*

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

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

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

142 *Future provision of CPS*

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

153 *Clinical Pharmacy education and training*

154 9.1% (n=94) of pharmacists have successfully completed or are in the process of completing a postgraduate degree
155 or CPD-programme in clinical pharmacy (Table 4). 28.3% (n=294) of community pharmacists have a desire to
156 complete such a postgraduate education in the future (Table 4). Open responses show that Austrian community
157 pharmacists would welcome a much wider range of education and training programmes for qualified pharmacists
158 *“more education programmes for Austrian pharmacists please” [P042]; “postgraduate degrees and*
159 *PgCertificate programmes” [P073]. It is of special interest to respondents that the level of education is appropriate*
160 *“Education programmes should be building on each other not offer a simple repeat, foster networking [...]”*
161 *[P006] and that clinical pharmacy is seen as a key competency for all pharmacists. “Clinical pharmacy = key*
162 *competence of every pharmacist, instead of offering additional programmes we need to highlight that everyone*
163 *who has obtained his/her license is (or should) also be qualified as a clinical pharmacist” [P006]. Suggestions*
164 *for the future include mandatory continuing professional development and introducing concepts of clinical*

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

167

168 **Hospital Pharmacies**

169 *Current provision of CPS*

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

174 The two most commonly provided services are ward-based CPS (83.8%; $n=31$) and/or the provision of a dedicated
175 medicines information service to other healthcare professionals (54.1%; $n=20$). The ward pharmacist services are
176 mainly delivered daily (32.4%; $n=12$) or weekly (43.2%; $n=16$) with orthopaedics, surgery, geriatrics and internal
177 medicine the most frequently covered clinical specialties (Table 5). Most of CPS are offered at the point of patient
178 admission (43.2%; $n=16$) focusing on medication review (40.5%; $n=15$) and reconciliation (35.1%; $n=13$). Only
179 8.1% ($n=3$) of the hospitals also offer CPS at the point of discharge (Table 5).

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

189 89.2% ($n=33$) of all participating hospital pharmacies state that they document all or almost all of their suggested
190 clinical interventions routinely. 62.2% ($n=23$) use a validated classification system for the documentation of all
191 or almost all of their clinical pharmacists’ interventions. In most cases this is based on the French society for
192 clinical pharmacy tool (29.7%; $n=11$) (Table 5) [29].

193 *Future provision of CPS*

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

201 *Clinical pharmacy education and training*

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

208

209 **Discussion**

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

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

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

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

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

238 medication review services carried out in pharmacies thus still lags significantly behind countries such as the UK
239 [33]. However, this is not surprising as regulatory change and implementation of reimbursed medication reviews
240 as a mandatory element in the community pharmacy contract assisted in increasing CPS in the UK [34].

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

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

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

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

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

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

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

283

284 **Conclusion**

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

290 **Funding**

291 No special funding was obtained.

292 **Conflicts of interest**

293 The authors have no conflicts of interest to declare.

294

295 **References**

- 296 1. Austrian Federal Government. Zusammen. Für unser Österreich. Regierungsprogramm 2017-2022.
297 2017. [https://www.bundeskanzleramt.gv.at/documents/131008/569203/Regierungsprogramm_2017-
298 2022.pdf/b2fe3f65-5a04-47b6-913d-2fe512ff4ce6](https://www.bundeskanzleramt.gv.at/documents/131008/569203/Regierungsprogramm_2017-2022.pdf/b2fe3f65-5a04-47b6-913d-2fe512ff4ce6). Accessed 17 Dec 2018.
- 299 2. LeBlanc JM, Seoane-Vazquez E, Dasta JF. Survey of hospital pharmacist activities outside of the
300 United States. *Am J Health Syst Pharm*. 2007;64(16):1748-55.
- 301 3. Gums J, Changing the Direction of Clinical Pharmacy Outside the United States: Time to Step Up.
302 *Pharmacother*. 2013; 33(2):122–5.
- 303 4. Bulajeva A, Labberton L, Leikola S, Pohjanoksa-Mäntylä M, Geurts MME, de Gier JJ, Airaksinen M.
304 Medication review practices in European countries. *Res Social Adm Pharm*. 2014;10:731-740.
- 305 5. Canadian Pharmacists Association. A Review of Pharmacy Services in Canada and the Health and
306 Economic Evidence. 2016. [https://www.pharmacists.ca/cpha-ca/assets/File/cpha-on-the-
307 issues/Pharmacy%20Services%20Report%201.pdf](https://www.pharmacists.ca/cpha-ca/assets/File/cpha-on-the-issues/Pharmacy%20Services%20Report%201.pdf). Accessed 06 Oct 2018
- 308 6. Rose O, Derendorf H, Erzkamp S, Fujita K, Hartl A, Hoti K, Krass I, Obarcanin E, Saevels J,
309 Srimongkon P, Teichert M, Tsuyuki RT. Development of clinical pharmacy services in Australia,
310 Austria, Belgium, Bosnia Herzegovina, Canada, Germany, Japan, Kosovo, Switzerland, the
311 Netherlands, Thailand, USA and correlation with educational standards, level of research, and
312 implementation practices. *Int J Clin Pharmacol Ther*. 2018. <https://doi.org/10.5414/CP203264>
- 313 7. Bladh L, Ottosson E, Karlsson J, Klintberg L, Wallerstedt SM. Effects of a clinical pharmacist service
314 on health-related quality of life and prescribing of drugs: a randomised controlled trial. *BMJ Qual &
315 Saf*. 2011;20(9):738-46.

- 316 8. Bond CA, Raehl CL. 2006 national clinical pharmacy services survey: clinical pharmacy services,
317 collaborative drug management, medication errors, and pharmacy technology. *Pharmacother.*
318 2008;28(1):1-13.
- 319 9. Bunting B, Cranor CW. The Asheville Project: long-term clinical, humanistic, and economic outcomes
320 of a community-based medication therapy management program for asthma. *J Am Pharm Assoc.*
321 2006;46(2):133-47.
- 322 10. Bunting BA, Smith BH, Sutherland SE. The Asheville Project: clinical and economic outcomes of a
323 community-based long-term medication therapy management program for hypertension and
324 dyslipidemia. *J Am Pharm Assoc.* 2008;48(1):23-31.
- 325 11. Cranor CW, Bunting BA, Christensen DB. The Asheville Project: long-term clinical and economic
326 outcomes of a community pharmacy diabetes care program. *J Am Pharm Assoc.* 2003;43(2):173-84.
- 327 12. Christensen M, Lundh A. Medication review in hospitalised patients to reduce morbidity and mortality.
328 *The Cochrane Database Of Systematic Reviews.* 2016;
329 <https://doi.org/10.1002/14651858.CD008986.pub3>
- 330 13. Nkansah N, Mostovetsky O, Yu C, Chheng T, Beney J, Bond CM, Bero L. Effect of outpatient
331 pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. *The Cochrane*
332 *Database Of Systematic Reviews.* 2010; <https://doi.org/10.1002/14651858.CD000336.pub2>
- 333 14. Santschi, V, Chiolero A, Colosimo AL, Platt RW, Taffé P, Burnier M, Burnand B, Paradis G.
334 Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized
335 controlled trials. *J Am Heart Assoc.* 2014; <https://doi.org/10.1161/JAHA.113.000718>
- 336 15. Westerlund T, Marklund B. Assessment of the clinical and economic outcomes of pharmacy
337 interventions in drug-related problems. *J Clin Pharm Ther.* 2009;34(3):319-27.
- 338 16. Hadi MA, Alldred DP, Briggs M, Munyombwe T, Closs SJ. Effectiveness of pharmacist-led
339 medication review in chronic pain management: systematic review and meta-analysis. *Clin J Pain.*
340 2014;30(11):1006-14.
- 341 17. Lee JK, Grace KA, Taylor AJ. Effect of a pharmacy care program on medication adherence and
342 persistence, blood pressure, and low-density lipoprotein cholesterol: a randomized controlled trial.
343 *JAMA,* 2006;296(21):2563-71.
- 344 18. Stemer G, Laml-Wallner G, Kuegler I, Poelzleitner P, Messner S, Steininger S, Dolinar E, Zehetmayer
345 S. Comprehensive evaluation of clinical pharmacists' interventions in a large Austrian tertiary care
346 hospital. *Eur J Hosp Pharm: Sci Pract.* 2012;19:529-34.
- 347 19. Austrian Chamber Of Pharmacists. *Apotheke in Zahlen 2018.* Vienna (Austria): Österreichische
348 Apothekerkammer; 2018.
- 349 20. Langer T, Spreitzer H, Ditzfurth T, Stemer G, Atkinson J. Pharmacy Practice and Education in Austria.
350 *Pharmacy.* 2018; <https://doi.org/10.3390/pharmacy6030055>
- 351 21. Morak S, Vogler S, Walser S, Kijlstra N. Understanding the pharmaceutical care concept and applying
352 it in practice. Vienna (Austria): Austrian Federal Ministry of Health; 2010.
- 353 22. Austrian Chamber Of Pharmacists. *Medikamente im Griff.* 2017.
354 [https://www.apotheker.or.at/Internet/OEAK/newsprese.nsf/webPages/9EB7B28C7318AD5FC125806](https://www.apotheker.or.at/Internet/OEAK/newsprese.nsf/webPages/9EB7B28C7318AD5FC125806700296957?OpenDocument)
355 [700296957?OpenDocument](https://www.apotheker.or.at/Internet/OEAK/newsprese.nsf/webPages/9EB7B28C7318AD5FC125806700296957?OpenDocument). Accessed 17 Dec 2018.
- 356 23. Strasser D, Kretschmer E. GEMED Multiprofessionelles Geriatisches Medikationsmanagement in
357 stationären Alteneinrichtungen. 2018. <http://www.gemed.at/index.php/home>. Accessed 17 Dec 2018.
- 358 24. Frontini, R, Miharija-Gala T, Sykora J. EAHP Survey 2010 on hospital pharmacy in Europe: Part 1.
359 General frame and staffing. *Eur J Hosp Pharm.* 2012;19:385-387.
- 360 25. Frontini, R, Miharija-Gala T, Sykora J. EAHP Survey 2010 on hospital pharmacy in Europe: parts 4
361 and 5. Clinical services and patient safety. *Eur J Hosp Pharm.* 2013;20:69-73.
- 362 26. EAHP. European Statements of Hospital Pharmacy Survey Results 2016. 2017.
363 <http://www.eahp.eu/publications/survey/content/2018-statements-survey>. Accessed 08 Oct 2018.
- 364 27. EAHP. European Hospital Pharmacy Survey 2010. 2010.
365 <http://www.eahp.eu/publications/survey/eahp-2010-survey-hospital-pharmacy-practice-europe>.
366 Accessed 17 Dec 2018.
- 367 28. Hsieh, HE, Shannon, SE. Three Approaches to qualitative content analysis. *Qual Health Res.* 2005.
368 15(9):1277-88.
- 369 29. Allenet B, Bedouch P, Rose FX, Escofier L, Roubille R, Charpiat B, Juste M, Conort O. Validation of
370 an instrument for the documentation of clinical pharmacists' interventions. *Pharm World Sci.*
371 2006;28(4):181-8.

- 372 30. The Austrian Association of Hospital Pharmacists and Austrian Society of Hospital Pharmacy. Mission
373 Statement. 2018. <https://www.aahp.at/images/stories/Aktuelles/2018/Mission-Statement-2018-bunt.pdf>
374 Accessed 12 Jun 2019.
- 375 31. Martins SF, van Mil JWF, da Costa FA. The organizational framework of community pharmacies in
376 Europe. *Int J Clin Pharm*. 2015;37:896–905.
- 377 32. van Mil JWF, de Boer WO, Tromp THFJ. European barriers to the implementation of pharmaceutical
378 care. *Int J Clin Pharm*. 2001;9:163-168.
- 379 33. NHS England. Improving health and patient care through community pharmacy – Evidence resource
380 pack. 2013. <http://nellpc.org.uk/wp-content/uploads/2013/10/comm-pharmacy-resource.pdf>. Accessed
381 09 Feb 2019.
- 382 34. Scottish Government. Pharmacy. 2018. [https://www2.gov.scot/Topics/Health/NHS-
383 Workforce/Pharmacists/Pharmacy](https://www2.gov.scot/Topics/Health/NHS-Workforce/Pharmacists/Pharmacy). Accessed 12 Feb 2019.
- 384 35. Hossain LN, Fernandez-Llimos F, Luckett T, Moullin JC, Durks D, Franco-Trigo L, Benrimoj SI,
385 Sabater-Hernández I D. 2017. Qualitative meta-synthesis of barriers and facilitators that influence the
386 implementation of community pharmacy services: perspectives of patients, nurses and general medical
387 practitioners. *BMJ Open*. 2017; <https://doi.org/10.1136/bmjopen-2016-015471>
- 388 36. Marquis J, Schneider MP, Spencer B, Bugnon O, Du Pasquier S. Exploring the implementation of a
389 medication adherence programme by community pharmacists: a qualitative study. *Int J Clin Pharm*.
390 2014;36(5):1014-22.
- 391 37. Niquille A, Lattmann C, Bugnon O. Medication reviews led by community pharmacists in Switzerland:
392 a qualitative survey to evaluate barriers and facilitators. *Pharm Pract*. 2010;8(1):35-42.
- 393 38. Berbatis CG, Sunderland VB, Joyce A, Bulsara M, Mills C. Enhanced pharmacy services, barriers and
394 facilitators in Australia’s community pharmacies: Australia’s National Pharmacy Database Project. *Int
395 J Pharm Pract*. 2007;15:185–91.
- 396 39. American College Of Clinical Pharmacy Clinical Practice Affairs Committee. Clinical pharmacy
397 practice in the noninstitutional setting. A white paper from the American College of Clinical Pharmacy.
398 *Pharmacother*. 1992;12(4):358-64.
- 399 40. Doucette WR, Nevis J, Randal C, McDonough PR. Factor affecting collaborative care between
400 pharmacists and physicians. *Pharm*. 2005;1(4):565-578.
- 401 41. McDonough RP, Doucette WR. Developing Collaborative working relationships between Pharmacists
402 and Physicians. *J Am Pharm Assoc*. 2001;41(55):682-92.

404

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	<ul style="list-style-type: none"> • Federal state • Job role of participant • Number of pharmacists in each pharmacy • Average age of all employed pharmacists
Education and Training	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Medication reviews • Number and type of other services offered • Documentation type and frequency
Future provision of clinical pharmacy services	<ul style="list-style-type: none"> • Desire • Feasibility • Types of services anticipated
Open question	<ul style="list-style-type: none"> • 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

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

Provision of clinical pharmacy services in community pharmacies			
Questions	Community pharmacies (n=261)		No response n (%)
	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)	

417

418

419

420

421 **Table 4:** Responses on education from 261 community pharmacy (= 1038 pharmacists in total) and from 37
 422 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)	

423

424

425
426

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

Provision of clinical pharmacy services in hospital pharmacies			
Questions	Hospital pharmacies (n=37)		No response n (%)
	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
<i>Hospital pharmacy section:</i> How many pharmacists have a postgraduate specialisation in hospital pharmacy practice?	Number
<i>Hospital pharmacy section:</i> How many pharmacists are currently undergoing a postgraduate specialisation in hospital pharmacy practice?	Number
Clinical pharmacy services	
<i>Community pharmacy section:</i> Are you providing medication reviews as part of a medication management program at your pharmacy?	Yes/No
<i>Community pharmacy section:</i> Are there any other clinical pharmacy services provided (going beyond drug information on a daily basis) in your pharmacy?	Yes/No

<i>Community pharmacy section:</i> Which kind of other clinical pharmacy services are provided?	Free text
<i>Hospital pharmacy section:</i> Are pharmacists providing clinical pharmacy services at your hospital?	Yes/No
<i>Hospital pharmacy section:</i> How many FTE of the overall pharmacist workforce are used to deliver clinical pharmacy services?	Number
<i>Hospital pharmacy section:</i> Are the clinical pharmacy services delivered ward-based?	Yes/No Frequency: Daily/Weekly/Fortnightly/Monthly/Other/None Which clinical specialities are covered?
<i>Hospital pharmacy section:</i> Are clinical pharmacy services offered at the point of admission?	Yes/No Which services are provided? Medicines reconciliation/Medication review/Other
<i>Hospital pharmacy section:</i> Are clinical pharmacy services offered at the point of discharge?	Yes/No
<i>Hospital pharmacy section:</i> Does your pharmacy offer a dedicated medicines information service?	Yes/No
Documentation	
Are clinical pharmacy services documented?	<i>Community pharmacy section:</i> Yes/No Electronic patient record/Other electronic documentation/Paper form/Not applicable <i>Hospital pharmacy section:</i> 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 <i>Hospital pharmacy section:</i> Interest from pharmacists/physicians and nurses?
Further ideas regarding clinical pharmacy	

Further ideas regarding clinical pharmacy?	
--	--