

REVIEW ARTICLE

Role of pharmaceutical care in therapeutic regimens within the community pharmacy

Role farmaceutické péče v léčebných schématech ve veřejné lékárně

Anna Filotheidou • Panagiotis Theodosios-Nobelos • Charalampos Triantis

Received December 11, 2022 / Accepted February 1, 2023

Summary

The concept of pharmaceutical care (PC) has existed as a professional philosophy for more than 30 years. However, for a long period of time, little had been done for its integration into the regular practice of healthcare provision. The COVID-19 pandemic and the resulting increase in patient influx in the community pharmacies (CP) encouraged the exploration and establishment of new healthcare services provided within the CP. Nevertheless, these services of PC are still novel, and more can be done to expand the community pharmacists' current role in primary healthcare. This can be achieved by improving and expanding the newly established services, all while incorporating new ones, for the benefit of public health and the reduction of avoidable healthcare expenditures. This article reviews information about the benefits of this service regarding patient health and the reduction of financial expenses pertinent to adverse drug events within the setting of the CP. Adverse drug events account for significant healthcare expenses and patient distress due to relevant symptoms, emergency doctor visits, and increased hospitalization rates. Several studies conducted internationally have investigated the positive impact of PC practiced by community pharmacists. In spite of results sometimes presenting a non-continuous pattern, PC applied under specific conditions has tangible positive outcomes. Congestive heart failure and type 2 diabetes mellitus patients presented fewer hospital admissions, better symptom control, and higher adherence in comparison to control groups, while a study on asthma patients revealed improved inhalation techniques. All intervention groups

reported psychological improvement and a better understanding of their treatment. Special reference is made to the importance of this service for patients receiving anti-cancer treatment and how community pharmacists can have a crucial role in designing, monitoring, and re-designing these therapeutic schemes whose complexity and related adverse drug events negatively affect patient adherence. The role of community pharmacists was very important, especially for primary care, for both patients and healthcare systems during the pandemic, and it seems that it will remain decisive in the post-COVID era as well. The increased complexity of therapy and polypharmacy creates the need for organized, active participation of pharmacists in healthcare provision so that they can use their knowledge and skills under continuous cooperation with other healthcare professionals, thus providing coordinated services for the benefit of the patient.

Key words: pharmaceutical care • community pharmacy • drug therapy plan • Healthcare system

Souhrn

Koncept farmaceutické péče (FP) existuje jako profesní filozofie již více než 30 let, nicméně po dlouhou dobu bylo pro jeho začlenění do běžné praxe poskytování zdravotní péče učiněno jen málo. Pandemie COVID-19 a s ní spojený zvýšený příliv pacientů do veřejných lékáren (VL) podnítily zkoumání a zavádění nových zdravotnických služeb poskytovaných v rámci VL. Přesto jsou tyto služby lékárenské péče stále nové a pro rozšíření současné role komunitních lékárníků v primární zdravotní péči lze udělat více. Toho lze dosáhnout zlepšením a rozšířením nově zavedených služeb a zároveň začleněním nových služeb ve prospěch veřejného zdraví a snížení výdajů na zdravotní péči, kterým se lze vyhnout. Přestože farmaceutická péče (FP) existuje jako profesní filozofie od roku 1990, pro její začlenění do běžné praxe poskytování zdravotní péče bylo učiněno jen málo. Tento článek přináší přehled informací

A. Filotheidou • P. Theodosios-Nobelos • Ass. Prof. Charalampos Triantis,
PhD Pharmacist (✉)
Department of Pharmacy, Frederick University
Nicosia 1036, Cyprus
e-mail: hsc.tc@frederick.ac.cy

o přínosech této služby, pokud jde o zdraví pacientů a snížení finančních výdajů souvisejících s nežádoucími účinky léčivých přípravků v prostředí VL. Nežádoucí účinky jsou příčinou značných výdajů na zdravotní péči a potíží pacientů v důsledku příslušných symptomů, návštěv lékaře na pohotovosti a zvýšené míry hospitalizace. Několik studií provedených v mezinárodním měřítku zkoumalo pozitivní dopad farmaceutické péče, kterou vykonávají lékárníci ve VL. Navzdory výsledkům, které někdy vykazují nesouvislý průběh, má FP uplatňovaná za specifických podmínek hmatatelné pozitivní výsledky. U pacientů s městnavým srdečním selháním a diabetes mellitus 2. typu bylo zaznamenáno méně hospitalizací, lepší kontrola symptomů a vyšší adherence ve srovnání s kontrolními skupinami, zatímco studie na pacientech s astmatem odhalila zlepšení inhalačních technik. Všechny intervenční skupiny uváděly zlepšení psychického stavu a lepší porozumění léčbě. Zvláštní zmínka je věnována významu této služby pro pacienty podstupující protinádorovou léčbu a skutečnosti, že lékárníci ve VL mohou hrát klíčovou roli při navrhování, monitorování a změně návrhu těchto léčebných schémat, jejichž složitost a související nežádoucí účinky léčivých přípravků negativně ovlivňují adherenci pacientů. Úloha komunitních lékárníků byla během pandemie velmi důležitá, zejména pro primární péči, a to jak pro pacienty, tak pro systémy zdravotní péče, a zdá se, že bude rozhodující i v období po skončení pandemie. Zvýšená složitost terapie a polyfarmacie vytváří potřebu organizované a aktivní účasti lékárníků na poskytování zdravotní péče tak, aby mohli využívat své znalosti a dovednosti při kontinuální spolupráci s ostatními zdravotnickými pracovníky, a poskytovat tak koordinované služby ve prospěch pacienta.

Klíčová slova: farmaceutická péče • veřejná lékárna • plán farmakoterapie • systém zdravotní péče

Introduction

The idea of pharmaceutical care (PC) was first mentioned by Mikael et al.¹⁾ and Brodie²⁾ in 1975 and 1986, respectively. Subsequently, the publication of the landmark paper of Charles D. Hepler and Linda M. Strand's landmark paper³⁾ on PC demonstrated its impact on society and the pharmacy profession. The discussion around this topic seems to be arising once again in the post-pandemic era, alongside questions regarding its implementation in modern healthcare systems internationally.

Amidst the ongoing technological advancement and the increased complexity of therapeutic regimens and methods, one cannot oversee that the optimization of individual therapy now requires the involvement of various healthcare professionals, each utilizing their specialized knowledge for the benefit of the patient⁴⁾. This indicates the need for increased involvement of the pharmacist in clinical care and the development and expansion of the function of the community phar-

macy (CP). The way to achieve this purpose is through the ideological and practical changes dictated by the concept of PC. A concept that sets the foundation for reconsidering the pharmacy profession and reviews its significance in various functions; apart from simple dispensing of pre-manufactured products, the latter represents the limitation brought upon the pharmacist in the community pharmacy unit in the past decades.

Hepler and Strand established and expanded the definition of pharmaceutical care by stating that it is "the responsible provision of drug therapy to achieve definite outcomes that improve the patient's quality of life"³⁾. These outcomes can be all or some of the following: cure or prevention of disease, arresting or slowing of a disease process, treating or preventing disease symptomatology. This definition expands to include the roles of the pharmacist within this project (designing, implementing, monitoring, and reassessing of therapeutic plan), which is carried out under continuous communication and collaboration between the pharmacist, the patient, and other healthcare professionals (GPs, nurses, etc.). It describes pharmaceutical care as a function necessary to be integrated into healthcare systems and stresses the new responsibility binding the pharmacist regarding utilizing their professional knowledge and the quality of care provided to the patient. Following the discussions and different perceptions about this concept in practice, the Pharmaceutical Care Network Europe (recognized as an official association in 2004) defines pharmaceutical care as the pharmacist's contribution to the care of individual patients so that optimal drug use can effectively result in better health outcomes.

Pharmaceutical care's definition has undergone multiple modifications over time, the reason for this being the various interpretations by healthcare professionals. Some focused on the involvement of the pharmacist in clinical therapy, while others defined his/her role solely around the use of drug regimens, separating it from the clinical practice. In 1975 Mikael et al. presented the first definition of pharmaceutical care, focusing on the use of medication and evaluation of the outcomes¹⁾. Although it was the first one of this kind, the definition outlined the complex interpersonal relationships this service entails. Thus, various authors and authorities perceive PC as a responsibility shared by all healthcare professionals, while others attribute it solely to the pharmacy profession. This poses a necessity for reconsideration of PC's definition in accordance with the profession's evolution, including the pharmacist's contribution to the optimal use of medicines and health improvement⁵⁾.

Although different levels of PC have been implemented across Europe, general defects tend to occur, mainly concerning documentation, patient assessment, implementation of therapy, and patient monitoring⁶⁾. Despite this, there are differences in pharmacy cultures and health service provision among the countries, a fact that will be discussed along with the main

aspects of PC, especially in highly important diseases such as cardiovascular and related diseases, making a report on its future aspects through the new coronavirus era.

This review addresses the conceptual variances surrounding PC, its implications, and attempts to resolve frequently occurring practical issues and the potential of PC in upgrading patient care and minimizing costs. The aforementioned will be discussed along with the main aspects of PC as these can be implemented regarding highly important diseases, including, amongst others, cancer and CVS disorders. Finally, a reference is made in relation to the future aspects and the potential of PC regarding the new coronavirus era.

Levels of the function of pharmaceutical care

The concept of PC sets specific goals achieved through specific functions⁷⁾. These comprise the main role of the pharmacist and can be described as follows:

- Collection of patient information relevant to their health condition and their decisions considering their healthcare (demographic, administrative, medical, treatment and regimens in use, lifestyle choices, socioeconomic status).
- Examine the current medication plan and detect medication problems that may lead to insufficient therapy. These problems can arise due to inappropriate regimen, dosing, dosing schedule, route of administration, unnecessary regimen or untreated indications, substance abuse, drug interactions resulting from dietary habits, and drug-drug and drug-disease interactions. Other problems regarding medication and therapy may arise from a lack of patient adherence and compliance, often due to poor understanding of the treatment, financial limitations, or other conditions (e.g., reduced cognitive function in elderly patients).
- Clarification of realistic, achievable pharmacotherapeutic goals. The pharmacist should consider the patient's needs, laboratory test results, ethics, and lifestyle and proceed to the development of the medication plan in direct communication with the patient or their caregivers. The plan can be furthermore adjusted according to advice from other healthcare professionals.
- After implementing the medication plan, the pharmacist is responsible for monitoring its effectiveness and readjusting it if necessary. Again, the new medication plan is made under communication with other healthcare professionals, the patient, and individuals involved in their care.

Treatment failure or insufficiency – health, social and financial cost

Numerous factors deem necessary a change in the way society and even pharmacists themselves conceptualize the role of the profession. Adverse events such as drug-related morbidity and mortality burden patients by lowering the health-related quality of life and increasing

personal expenses related to healthcare (extra GP visits, treatment expenses, traveling to and from a hospital). Drug-related morbidity is defined as treatment insufficiency, meaning that the medication chosen did not exert its beneficial effects completely. This may result from the administration of an inappropriate regimen, failure of administration, or unsuccessful monitoring of treatment by healthcare professionals. However, the most important factor appears to be the lack of adherence by the patient⁸⁾. For many therapeutic regimes, adherence to the instructions given by the physician or the pharmacist is fundamental to ensure health improvement. Lack of adherence is often responsible for undertreatment or even health deterioration. Also, nonspecific, idiosyncratic reactions to the medication, including the placebo phenomenon, can be partly responsible^{9, 10)} but are unpredictable in most cases. If drug-related morbidity remains unresolved, it can lead to complications, adverse drug events such as intoxication, hospitalization, permanent health damage, and even death (drug-related mortality). The risk of treatment insufficiency is higher after hospital discharge, possibly due to inconsistent care, especially when the medication regimen changes and the patient is away from professional monitoring. As the patients' care is moved from the hospital to the community pharmacy, follow-up counselling with the pharmacist has been linked to better detection of preventable adverse drug events (ADE) and reduction of their occurrence¹¹⁾.

From a financial perspective, a 2018 study revealed an annual cost of about \$ 528.4 billion resulting from non-optimized medication therapy and the consequential drug-related morbidity and mortality- this amount translated to 16% of total US healthcare expenditures in 2016. The authors suggest the expansion of medication management by incorporating clinical pharmacists in the prescribing procedure, alongside physicians, to mitigate this avoidable financial burden and improve patient health¹²⁾.

Studies support that double-checking prescriptions is related to increased error detection¹³⁾, especially in cases of high-alert medications. An observational study examining ADEs in a pediatric neonatal intensive care unit in New Zealand involving 495 patients admitted in 2002 revealed that 56.7% of ADEs could have been prevented. Of the mentioned ADEs, 46% were serious, and this percentage rose to 82% regarding potential ADEs. The study concludes that the annual cost of preventable ADEs was calculated to be 148,287 NZ\$¹⁴⁾. A more recent 12-month-long study about ADEs leading to hospital admission from the emergency department in Spain concluded that 19.4% of admissions resulted from ADEs, 20.4% of these leading to permanent damage or admission to the intensive care unit. Furthermore, the study classifies 65% of them as preventable, with the cost of ADE-related treatment and hospitalization being 237,377 €¹⁵⁾.

The above data suggest that such events have a direct impact on healthcare systems' structure by increasing

resources, staffing, and financial costs related to the hospitalizations and treatments of conditions caused by medication errors and other drug-related problems (DRPs). These phenomena can be prevented through PC services that individualize therapy and aim to predict possible medication errors and resolve the ones already existing. In this area, evolutionary changes can bring upon economic benefits since due to the non-optimal cost of therapeutic plans (as this increases due to the need for additional ADE treatment), medication therapeutic management remains an unmet request for both the insurance sector and the pharmacists, who are trying to optimize healthcare costs and establish more than dispensing services alone, respectively¹⁶⁾. This is in agreement with the finding of no significant increase of direct healthcare costs of PC in elderly groups, but with significant health improvement in a cost-effective manner¹⁷⁾.

Pharmaceutical care – impact on healthcare provision

Various researchers have studied the impact of PC in reducing DRPs and related costs in several settings (community pharmacy, hospital, etc.). The results demonstrate significant improvement in the patient's condition mainly through psychosocial mechanisms¹⁸⁾, possibly due to the education the patients receive through PC, so they gain better information and understanding of their treatment and have better control over their health condition¹⁹⁾.

In 2001, Bernstein and colleagues examined the impact of PC in the level of CP²⁰⁾. The study included pharmacies from several countries and elderly patients above 65 years of age. Danish data showed a statistically significant difference in hospitalizations reported by the experimental and the control group (35.6 and 40.4%, respectively). This decrease may be related to a substantial increase in the pharmaceutical services available in CP, such as smoking cessation, medication review, inhaler usage service, new medicines, including counseling and patients' adherence, and residential facilities services²¹⁾. Other countries presented a positive impact of the service, but in inconsistent pattern, attributed to technical difficulties arising during data collection and patient recruitment. It was suggested that a reason might be the type of patient group. Elderly patients can present various responses to medication due to altered pharmacokinetics and increased illness burden; thus, such results are difficult to generalize²⁰⁾. Other studies examining pharmaceutical care have obtained satisfactory results by using disease type (rather than age), as a recruitment criterion.

A study conducted in India resulted that consumers' perception about CP and the services offered was mediocre. Pharmacists have to upgrade their skills through educational programs, in order to gain the trust of the public not as medicine sellers but as health care professionals²²⁾. In China the provision of care by CP has been shown to lack improvement, with the main rea-

sons to be the lack of space, law implication issues and especially lack of face-to-face communication with the patient, asserting the indisputable effect of communication²³⁾. Thus, most pharmacists (chain or independent), provided only very basic PC services, rather than advanced ones. Similarly, in a public survey in Jordan, the pharmaceutical care concept is still vague, while more than half of the participants had no previous knowledge of PC. Some challenges and barriers are related to patients' belief that the most important task of pharmacists is the dispensing of medications. At least the majority of respondents (> 85%) respond that pharmacists have a role in providing healthcare services²⁴⁾.

Neto and colleagues²⁵⁾, concluded that the practice of PC in community health care units improved clinical measurements by reducing cardiovascular risk in the elderly with coexisting comorbidities. In another study, there has been a decrease in the incidence of coronary heart disease in patients with metabolic syndrome monitored through PC programs by 44%²⁶⁾. These numbers are indicative of an economic healthcare burden that can be avoided by integrating the service into the standard care plan²⁷⁾.

Another disease-specific study in diabetes mellitus type 2 (T2DM) examined the relationship between pharmaceutical care provision and the control of risk factors leading to cardiovascular disease²⁸⁾. The intervention patient group had special medication profiles made for them, close monitoring in order to set personal treatment goals, and re-assessment of the therapy plan when necessary. The patients of the same group were encouraged to comply with the therapy plan through a face-to-face meeting with their health specialists and were provided with educational material so they could fully understand their condition and the effects of their medication. Healthcare professionals involved were in continuous communication among them to share patient-specific data. The results demonstrated important reductions in blood pressure and better control of plasma glucose levels than in the control group. This is indicative of the effects of pharmaceutical care, as 45% of T2DM patients have poor control of their plasma glucose levels, with the main reason being low adherence²⁹⁾. This is applied even for the ambulatory elderly, where there was a significant (up to 83%) decrease in HbA_{1c} levels, with no significant increase in the medical expenses³⁰⁾. It has been seen that engagement in T2DM self-management education leads to a statistically significant decrease in A1C levels³¹⁾. Since T2DM patients are in greater risk of cardiovascular disease, better control of risk factors reduces the expenses for additional costly treatments, hospital admissions, and mortality rates due to cardiovascular disease (CVDs) events. In this direction, CP can improve glycemic control in patients with T1DM and T2DM via patient-centered and interdisciplinary intervention, such as giving feedback to the physician, setting patient's aims, and improving patients' beliefs and knowledge towards the medication, reviewing it if necessary³²⁾.

Regarding asthma patients, a pragmatic community pharmacy-based programme can significantly improve their therapeutic outcomes³³. A study focused on asthma patients receiving community-based PC was conducted in Germany. The patients presented improved self-efficacy and inhalation technique, the latter being an important factor regarding therapy outcomes. By the end of the study, intervention patients had acquired better knowledge about their health condition, which may increase future adherence³⁴. Another study, conducted in Germany with the inclusion of community pharmacies, primary care physicians, and patients with asthma, found increased improvement in quality of life, medication adherence, self-efficacy, and knowledge, along with a parallel decrease in the symptom severity, highlighting the clinical, potentially economic and humanistic effects of PC³⁵. The same results were delivered through intervention on inhalation technique and adherence to maintenance therapy in patients with chronic obstructive pulmonary disease, succeeding in improved inhalation scores and medication adherence with a significant decrease in hospitalization rates³⁶.

The need for disease-specific PC is even greater for cancer patients receiving medication from community pharmacies since they are at a higher risk of low adherence due to the complexity of therapeutic schemes, experiencing adverse effects and emotional distress related to the disease. Oral anti-cancer treatments are linked to a high risk of adverse effects and drug-drug and drug-food interactions³⁷. Many of these agents often target very specific malignancies that pharmacists rarely see during the span of their professional practice. It is important that community pharmacists treating such patients have access to literature and relevant databases so they can identify and prevent possible interactions³⁸.

Additionally, documentation of the drug-related events the patient experiences can be of importance when a re-assessment of the medication plan takes place. This can be done during the counseling sessions (face-to-face or via call) arranged on a standard basis to monitor adherence and ensure that the patient is receiving the full outcome of the therapy. For these purposes, documentation forms and patient-filled questionnaires specifically designated for patients under anti-cancer treatment should be integrated into the prescription information kept by the pharmacist^{39, 40}. The implementation and standardization of such forms can be proved to be an important tool in disease progression monitoring and can facilitate easier communication among the entire healthcare team, including GPs and oncology specialists.

An important aspect of treatment relies on the ageing and the cognitive impairment, with the most important drawbacks being the reluctance to disclose the impairment, the problem of overdosing, and the inability to follow instructions no matter the means they are given⁴¹. Furthermore, lack of knowledge, poor understanding of mental disorders, and low stock of psychotropic and

mental disease-related drugs seem to cause more problems related to the role the community pharmacist has to play⁴². The fact is that there is a need for training CP personnel to revisit their perception of older people with mental impairment and offering the means for awareness and communication of the professionals, improving their interpersonal skills without patronizing the patients. Towards this direction, the community pharmacist could assist in simplifying or even altering dosing schemes when deemed necessary, home counseling, pharmaceutical regimen administration record, etc. Thus, through a trusting relationship and a proactive role in innovative services offered to older people, PC may improve their experience by decreasing the complexity of prescription ordering, collection, and delivery⁴³. Formulating the right perception around the nature and effectiveness of PC by the pharmacists themselves has a pivotal role in transforming their training and the current services provided. It is important that as active representatives of the primary healthcare sector, they comprehend these principles so that they can move in this direction. Thus, prescription processing, delivery to the homes, and only partly advice to care homes have been found to be their main service lacking in the monitoring of appropriateness, safety, and reviewing of drug therapy⁴⁴.

Technological advancement in medical sciences challenges community pharmacies to follow a new, complex role. Modernization of the CP should be realized through gradual but substantial changes⁴⁵. These concern the educational system through which pharmacists acquire knowledge and develop skills and the healthcare system, which defines their professional role by allowing them to function as healthcare providers. One could argue that the pharmaceutical profession often lacks the specialization that follows basic education. For instance, as was stated above, special groups of patients need specially tailored drug provision, while the basic education scheme often lacks specialization pathways. Specialization options added to the basic pharmacy studies and educational seminars and workshops should deem the pharmacist capable of functioning in more specific areas.

Another step to regular pharmaceutical care could be the encouragement of digitalization. A number of digital tools have been developed to improve treatment adherence and minimize prescription errors. They are an easy, cost-effective way of gathering patient and drug-related information and communication among healthcare professionals⁴⁶. Also, state of the art personalized eHealth platforms, with 24/7 support services, could optimize pharmacotherapy and PC, especially on medication history review, drug interactions, poor compliance, and prevention of drug-related problems⁴⁷. In many healthcare systems across the world, pharmacists and GPs often work parallelly due to a lack of integration of both sides into one coordinated scheme⁴⁸. These separations can affect the patient negatively as their therapy is not monitored as

effectively as it could, increasing the risk of preventable ADEs. The mutual coordination of healthcare providers should be ensured by governmental mechanisms and other factors affecting healthcare, such as insurers. As suggested by statistical evidence, implementing PC could result in significant financial benefits for the government, insurance, and patient expenses.

However, implementation problems arise when it comes to daily practice. As pharmaceutical care is a concept that involves multiple sides, its seamless provision can be disrupted by problems affecting the patients, the caregivers, or the GPs.

Patients with limited ability to move to the CP due to financial or health-related reasons could overcome these limitations by arranging telephone counselling sessions. Patients with cognitive impairment are a special category and require closer monitoring as they are more prone to drug misuse and often fail to express medication-related symptoms. Counselling should involve the caregivers as well so that any drug misuse event or suspicion can be documented, especially for patients with mild cognitive impairment who are still capable of functioning independently and living alone.

Another problem regarding the provision of PC is the lack of space and understaffing of pharmacies. In many facilities, the staff tends to a patient population disproportional to the facility's capacity. Thus, individualization and special monitoring of therapy are inconsistent or even impossible. Lack of space usually leads to a lack of counseling as the existing space is dedicated to more essential functions (storage etc.). In these cases, either pharmaceutical care is not provided at all, or it takes place in a less suitable environment (for example, the pharmacy's waiting area or counter desk), causing intimidation to the patient who might choose to avoid mentioning facts related to the treatment due to inadequate privacy.

Thus, the need for investment in staffing and space reconstruction arises. However, such investments can prove costly, and many pharmacies avoid this financial risk as PC has not or has only been partially established among various healthcare systems (so its potential to compensate for these investments is seen as unsure)⁴⁹⁾. These circumstances discourage investing on PC and ensuring the necessary infrastructure. This issue could only be counterbalanced through the official recognition of PC as a compensable service, officially integrated within the healthcare system, with the compensation fees being financially proportional to the amount of staff, working time, and knowledge needed to provide such services. Elimination of these concerns requires reassessing the funds invested in healthcare in order to ensure appropriate facilities. It has been suggested that a model taking into account direct and indirect outcomes in financial and quality of life levels should be adjusted to the PC system⁵⁰⁾.

Another concern regarding seamless PC implementation is the limited access to patient information. Many healthcare systems worldwide have only re-

cently started to implement a cohesive digital patient chart that includes information on various aspects of his health condition, while in some cases, such digital systems are to date nonexistent. Moreover, in some cases, while patient information and prescribing have been digitalized, the sum of the information is scattered throughout different platforms or is accessible only partially to specific healthcare professionals (not all of them involved in the respective patient's care).

Furthermore, usually, the prescribing platforms are designed so that the prescribing doctor indicates the scheme, and the pharmacist can only dispense it, with minimum or no possibilities of official and traceable modifications or corrections from the pharmacist's side in the case the pharmacist has detected an error. These factors may lead to inconsistent care and medication errors arising because one provider may not be aware of the medication the patient has received from another one—especially in cases of manual, non-digital prescribing. In the level of the CP, this may translate to that the pharmacist cannot access previously administered prescriptions so they are unaware of other medications the patient may be using or that they cannot intervene in the official prescription scheme when an error arises and contact the prescriber. So, during the design of prescribing and related healthcare platforms, accessibility, and comprehensiveness, should be taken into consideration, as well as the possibility of official communication among healthcare professionals from the GP's level to the CP level.

Considering the financial compensation of the pharmacists involved, it can be argued that since the absence of pharmaceutical care and lack of pharmacists' advice during the prescribing procedure (as prescribing often involves mainly or exclusively GPs) cause significant burdens in healthcare systems, the establishment of PC could be compensated by using the healthcare funds that would otherwise be used to treat the medication error-related morbidities and mortality. Such conditions often require more GP visits, medication and hospitalization, meaning additional treatment requiring compensation of multiple healthcare professionals anew and increase of their workload (GPs, nurses, new medication fees). It can thus be argued that since PC is a service that relieves the healthcare system's workload and expenditures, the compensation fee of a single healthcare professional (the pharmacist as a PC provider) would pose considerably less of a financial burden to the healthcare systems, all while decreasing patient influx to hospitals and health centers and resulting staff burnout.

Future perspectives in a post-COVID era

The COVID-19 pandemic has pointed out the significant role of CP in the massive efforts for the control of community transmission. Community pharmacists, as maybe the most easily accessible healthcare providers, played out a crucial role in primary care. Starting

from reporting suspected cases of transmission, educating about self-protective measures, minimizing the transferring of patients to various health provision locations, ensuring access to pharmacotherapy, and monitoring with minimum face-to-face contact during quarantine conditions and in parallel managing the general emotional distress of the public⁵¹), pharmacists contribute to assisting the community seamlessly since the initial stages of the pandemic. It should be noted that in the past few years, another PC service, the immunization of the general public in pharmacies, has shown to be well received by the general public as the community pharmacy is more accessible in comparison to other healthcare facilities and contributes to faster patient immunization during the flu season, when the healthcare system is more intensely burdened by respiratory cases, especially in the post-COVID-19 era. A recent study described the impact of the COVID-19 pandemic on the provision of PC in the Netherlands, both in logistical processes and services related to patient education and counseling. The authors encouraged the pharmacist to implement telepharmacy or remote services to minimize direct patient-provider contact for optimally supporting patients⁵²). Furthermore, the temperature screening of the patient, the fourteen days quarantine and the manner they will seek for assistance is related to the advices the pharmacist will offer to the patient. Another important matter during this period was the safe use of infusions and inhaled drugs, the management of vulnerable groups and the home care treatment for patients with suspected COVID-19 infection, with the safety operation strategies, the recognition of the symptoms of the disease and the monitoring of signs of adverse reactions in the management of chronic diseases being some of the community pharmacist's responsibilities. The experience gained has enabled, both clinical and community pharmacists to provide high-level pharmaceutical care and public health services against coronavirus by following specific recommendations and guidelines^{53–55}).

It is considered necessary to establish criteria, including patients' satisfaction, to evaluate the provision of PC. A study assessed the patients' satisfaction with the PC provided by the community pharmacists in Slovakia. The respondents' positive assessments were more than 65%; the Interpersonal Relationship was the most positively assessed dimension and the Managing Therapy dimension was the least⁵⁶). Undoubtedly there is a need for a more active involvement of the pharmacist in a personalized and patient-oriented PC program⁵⁷). In this direction pharmacists can assist the technological advancement, covering areas such as medical errors, manipulation of the prescriptions via live or virtual communication channels with the patient, especially for certain population groups (children, elderly, etc.), building stronger bonds with other healthcare professionals and improving patients' navigation in a complex healthcare system.

Considering that a vast amount of knowledge about PC and its potential originates from hospital and clinical settings, it could be argued that this knowledge can be utilized as a foundation to expand and design future aspects of PC, bridging up to an extend the gap between these different healthcare levels, while at the same time procedures and services are re-adapted to fit the CP setting. This re-envisioning of the CP setting has the potential to deem PC more accessible throughout the community and maintain the effects of consistent, holistic care before, during and after hospitalization (and at the same time help avoid preventable costs, re-hospitalizations or even deaths).

Conclusion

To date, pharmaceutical care is not practiced systematically. Implementation problems include financial and bureaucratic reasons as well as social misconceptions limiting the role of the community pharmacy to drug dispensing, overlooking its potential for advanced individualized care patient-related activities such as the implementation of therapeutic objectives and recognition of patients' satisfaction. As suggested by various researchers, providing this service will help the patient receive optimal results from a therapeutic scheme. Positive effects include a reduction of drug-related morbidity and mortality and related expenses. This can be realized only when pharmaceutical care is seen as a substantial element of primary healthcare and not as an optional service. This general reconsideration and the respective public pressure will help integrate it into the pharmacist's fundamental role. For this purpose, the organized efforts of healthcare professionals are necessary, with pharmacists having a leading role in the education of the public and practical steps towards effective community-pharmacy-based care.

Funding

This research received no specific grant from any funding agency in public, commercial, or not-for-profit sectors.

Conflict of interests: none.

References

1. **Mikeal R. L., Brown T. R., Lazarus H. L., Vinson M. C.** Quality of pharmaceutical care in hospitals. *Am. J. Health Syst. Pharm.* 1975; 32, 567–574.
2. **Brodie D. C.** Drug-use control: keystone to pharmaceutical service. *Drug Intell. Clin. Pharm.* 1986; 20, 116–117.
3. **Hepler C. D., Strand L. M.** Opportunities and responsibilities in pharmaceutical care. *Am. J. Health Syst. Pharm.* 1990; 47, 533–543.
4. **Cipolle R., Strand L., Morley P.** *Pharmaceutical Care Practice: The Patient-Centered Approach to Medication Management Services*, Publisher McGraw-Hill Education, 3rd ed. 2012.

5. **Allemann S. S., van Mil J. W. F., Botermann L., Berger K., Griesse N., Hersberger K. E.** Pharmaceutical care: The PCNE definition 2013. *Int. J. Clin. Pharm.* 2014; 36, 544–555.
6. **Hughes C. M., Hawwa A. F., Scullin C., Anderson C., Bernsten C. B., Björnsdóttir I., Cordina M. A., da Costa F. A., de Wulf I., Eichenberger P., Foulon V., Henman M. C., Hersberger K. E., Schaefer M. A., Søndergaard B., Tully M. P., Westerlund T., McElnay J. C.** Provision of pharmaceutical care by community pharmacists: A comparison across Europe. *Pharm. World Sci.* 2010; 32, 472–487.
7. **Wiedenmayer K., Summers R. S., Mackie C. A., Gous A. G. S., Everard M.** Developing pharmacy practice: A focus on patient care. World Health Organization (WHO) and International Pharmaceutical Federation (FIP). WHO/PSM/ PAR/2006.5.
8. **Osterberg L., Blaschke T.** Adherence to medication. *N. Engl. J. Med.* 2005; 353, 487–497.
9. **Barsky A. J., Saintfort R., Rogers M. P., Borus J. F.** Non-specific medication side effects and the nocebo phenomenon. *JAMA* 2002; 287, 622–627.
10. **Theodosios-Nobelos P., Filotheidou A., Triantis Ch.** The placebo phenomenon and the underlying mechanisms. *Hormones* 2021; 20(1), 61–71.
11. **Schnipper J., Kirwin J., Cotugno M., Wahlstrom S. A., Brown B. A., Tarvin E., Kachalia A., Horng M., Roy C. L., McKean S. C., Bates D. W.** Role of pharmacist counseling in preventing adverse drug events after hospitalization. *Arch. Intern. Med.* 2006; 166, 565–571.
12. **Watanabe J. H., McInnis T., Hirsch J. D.** Cost of Prescription Drug – Related Morbidity and Mortality. *Ann. Pharmacother.* 2018; 52, 829–837.
13. **Douglass A. M., Elder J., Watson R., Kallay T., Kirsh D., Robb W. G., Kaji A. H., Coil C. J.** A Randomized Controlled Trial on the Effect of a Double Check on the Detection of Medication Errors. *Ann. Emerg. Med.* 2018; 71, 74–82.
14. **Kunac D. L., Kennedy J., Austin N., Reith D.** Incidence, preventability, and impact of Adverse Drug Events (ADEs) and potential ADEs in hospitalized children in New Zealand: a prospective observational cohort study. *Paediatr. Drugs* 2009; 11, 153–160.
15. **Pérez Menéndez-Conde C., Bermejo Vicedo T., Delgado Silveira E., Carretero Accame E.** Adverse drug reactions which provoke hospital admission. *Farm Hosp* 2011; 35, 236–243.
16. **Christensen D. B., Farris K. B.** Pharmaceutical care in community pharmacies: Practice and research in the US. *Ann. Pharmacother.* 2006; 40, 1400–1406.
17. **Obreli-Neto P. R., Marusic S., Guidoni C. M., Baldoni Ade O., Renovato R. D., Pilger D., Cuman R. K., Pereira L. R.** Economic evaluation of a pharmaceutical care program for elderly diabetic and hypertensive patients in primary health care: A 36-month randomized controlled clinical trial. *J. Manag. Care Spec. Pharm.* 2015; 21, 66–75.
18. **Siamidi A., Naziris N., Pippa N., Demetzos C.** Pharmaceutical care: The driving force for patient-centered healthcare system. *Pharmakeftiki* 2017; 29, 34–41.
19. **Askham J., Coulter A., Parsons S.** Where are the patients in decision-making about their own care? Health systems and policy analysis. WHO Policy Brief 2008.
20. **Bernsten C., Björkman I., Caramona M., Crealey G., Frøkjær B., Grundberger E., Gustafsson T., Henman M., Herborg H., Hughes C., McElnay J., Magner M., van Mil F., Schaeffer M., Silva S., Søndergaard B., Sturgess I., Tromp D., Vivero L., Winterstein A; Pharmaceutical care of the Elderly in Europe Research (PEER) Group.** Improving the well-being of elderly patients via community pharmacy-based provision of pharmaceutical care. *Drugs Aging* 2001; 18, 63–77.
21. **Abrahamsen B., Burghle A. H., Rossing C.** Pharmaceutical care services available in Danish community pharmacies. *Int. J. Clin. Pharm.* 2020; 42, 315–320.
22. **Deepalakshmi M., Arun K. P., Mathew S. A., Boopathi D., Ponnusankar S.** Knowledge, attitude and perception of general public on the cognitive pharmaceutical care services provided by community pharmacists – a cross sectional study. *Int. J. Pharm. Res.* 2019; 11(4), 161–168.
23. **Xi X., Huang Y., Lu Q., Ung C. O. L., Hu H.** Community pharmacists' opinions and practice of pharmaceutical care at chain pharmacy and independent pharmacy in China. *Int. J. Clin. Pharm.* 2019; 41, 478–487.
24. **Mukattash, T. L., Bazzi, N. H., Nuseir, K. Q., Jarab, A. S., Abu-Farha, R. K., Khdour, M. R.** Pharmaceutical care in community pharmacies in Jordan: A public survey. *Pharm. Pract.* 2018; 16(2), 1126.
25. **Neto, P. R. O., Marusic, S., de Lyra Júnior, D. P., Pilger, D., Cruciol-Souza, J. M., Gaeti, W. P., Cuman, R. K. N.** Effect of a 36-month pharmaceutical care program on the coronary heart disease risk (CHD) in elderly diabetic and hypertensive patients. *J. Pharm. Sci.* 2011; 14, 249–263.
26. **Plaster, C. P., Melo, D. T., Boldt, V., Cassaro, K. O. D. S., Lessa, F. C. R., Boëchat, G. A. P., Andrade, T. U. D.** Reduction of cardiovascular risk in patients with metabolic syndrome in a community health center after a pharmaceutical care program of pharmacotherapy follow-up. *Braz. J. Pharm. Sci.* 2012; 48, 435–446.
27. **LaPointe N.M., Jollis J.G.** Medication errors in hospitalized cardiovascular patients. *Arch. Intern. Med.* 2003; 163, 1461–1466.
28. **Clifford R. M., Davis W. A., Batty K. T., Davis T. M.** Effect of a Pharmaceutical Care Program on Vascular Risk Factors in Type 2 Diabetes. *Diabetes Care* 2005; 28, 771–776.
29. **Polonsky W. H., Henry R. R.** Poor medication adherence in type 2 diabetes: Recognizing the scope of the problem and its key contributors. *Patient Prefer Adherence* 2016; 10, 1299–1306.
30. **Chen J.-H., Ou H.-T., Lin T.-C., Lai E.C.-C., Yang Kao Y.-H.** Pharmaceutical care of elderly patients with poorly controlled type 2 diabetes mellitus: a randomized controlled trial. *Int. J. Clin. Pharm.* 2016; 38, 88–95.
31. **Chrvala C. A., Sherr D., Lipman R. D.** Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control. *Patient Educ. Couns.* 2016; 99, 926–943.
32. **Deters M. A., Laven A., Castejon A., Doucette W. R., Ev Lisiane S., Krass I., Mehuys E., Obarcanin E.,**

- Schwender H., Laeer S.** Effective Interventions for Diabetes Patients by Community Pharmacists: A Meta-analysis of Pharmaceutical Care Components. *Ann. Pharmacother.* 2018; 52, 198–211.
33. **Mehuys E., van Bortel L., de Bolle L., Van Tongelen I., Annemans L., Remon J. P., Brusselle G.** Effectiveness of pharmacist intervention for asthma control improvement. *Eur. Respir. J.* 2008; 31, 790–799.
 34. **Schulz M., Verheyen F., Mühlig S., Müller J. M., Mühlbauer K., Knop-Schneickert E., Petermann F., Bergmann K. C.** Pharmaceutical Care Services for Asthma Patients: A Controlled Intervention Study. *J. Clin. Pharmacol.* 2001; 41, 668–676.
 35. **Mangiapane S., Schulz M., Mühlig S., Ihle P., Schubert I., Waldmann H.C.** Community pharmacy-based pharmaceutical care for asthma patients. *Ann. Pharmacother.* 2005; 39, 1817–1822.
 36. **Tommelein E., Mehuys E., van Hees T., Adriaens E., Van Bortel L., Christiaens T., van Tongelen I., Remon J. P., Boussery K., Brusselle G.** Effectiveness of pharmaceutical care for patients with chronic obstructive pulmonary disease (PHARMACOP): A randomized controlled trial. *Br. J. Clin. Pharmacol.* 2014; 77, 756–766.
 37. **Hugtenburg J., Timmers L., Beckeringh J.** Pharmaceutical Care for Cancer Outpatients. In: *The Pharmacist Guide to Implementing Pharmaceutical Care*. Eds: Alves da Costa F, van Mil F, Alvarez-Risco A. 2019; 397–419.
 38. **Ribed A., Romero-Jiménez R. M., Escudero-Vilaplana, V., Iglesias-Peinado I., Herranz-Alonso A., Codina C., Sanjurjo-Sáez M.** Pharmaceutical care program for onco-hematologic outpatients, safety, efficiency and patient satisfaction. *Int. J. Clin. Pharm.* 2016; 38, 280–288.
 39. **Broadfield L., Shaheen P., Rogez M., Jamieson K., McCallum M.** Guidelines for outpatient cancer care by community pharmacists. *Can. Pharm. J.* 2017; 15, 24–31.
 40. **van Mil J. W. F., Schulz M.** A review of pharmaceutical care in community pharmacy in Europe. *Harvard Health Policy Review* 2006; 7, 155–168.
 41. **Alhusein N., Killick K., Macaden L., Smith A., Stoddart K., Taylor A., Kroll T., Watson M. C.** We're really not ready for this: A qualitative exploration of community pharmacy personnel's perspectives on the pharmaceutical care of older people with sensory impairment. *Disab. Health J.* 2019; 12, 242–248.
 42. **Wong Y. X., Khan T. M., Wong Z. J., Ab Rahman A. F., Jacob S. A.** Perception of community pharmacists in Malaysia about mental healthcare and barriers to providing pharmaceutical care Services to patients with mental disorders. *Community Ment. Health J.* 2020; 56, 88–98.
 43. **Wood K., Gibson F., Radley A., Williams B.** Pharmaceutical care of older people: What do older people want from community pharmacy? *Int. J. Pharm. Pract.* 2015; 23(2), 121–130.
 44. **Navti B., Apampa B.** Pharmaceutical care services to people living with dementia in care homes: A qualitative study of community pharmacists' perceptions. *Dementia* 2019; 18(6), 2282–2302.
 45. **Berenguer B., la Casa C., de la Matta M.J., Martín-Caleiro M. J.** Pharmaceutical Care: Past, Present and Future. *Curr. Pharm. Des.* 2004; 10, 3931–3946.
 46. **Austin R. R., Hull S.** The power of mobile health technologies and prescribing apps. *Comp. Inform. Nurs.* 2014; 32, 513–515.
 47. **Spanakis M., Sfakianakis S., Kallergis G., Spanakis E.G., Sakalis V.** Pharm Acta: Personalized pharmaceutical care eHealth platform for patients and pharmacists. *J. Biomed. Inform.* 2019; 100, 103336.
 48. **Hepler C. D.** Clinical pharmacy, pharmaceutical care, and the quality of drug therapy. *Pharmacotherapy* 2004; 24, 1491–1498.
 49. **GBD 2016 DALYs and HALE Collaborators.** Global, regional, and national disability-adjusted life-years (DALYs) for 333 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390, 1260–1344.
 50. **Drummond M., Sculpher M., Torrance G., O'Brien B., Stoddart G.** *Methods for the economic evaluation of healthcare programmes*, 3rd ed. New York: Oxford University Press 2005.
 51. **Zheng S. Q., Yang L., Zhou P. X., Li H. B., Liu F., Zhao R. S.** Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: A China perspective. *Res. Social Adm. Pharm.* 2021; 17, 1819–1824.
 52. **Koster E. S., Philbert D., Bouvy M. L.** Impact of the COVID-19 epidemic on the provision of pharmaceutical care in community pharmacies. *Res. Social Adm. Pharm.* 2021; 17, 2002–2004.
 53. **Song Z., Hu Y., Zheng S., Yang L., Zhao R.** Hospital pharmacists' pharmaceutical care for hospitalized patients with COVID-19: Recommendations and guidance from clinical experience. *Res. Social Adm. Pharm.* 2021; 17, 2027–2031.
 54. **COVID-19: Guidelines for Pharmacists and the Pharmacy Workforce.** Updated 26 March 2020. FIP Healthy Advisory. International Pharmaceutical Federation. www.fip.org/files/content/priority-areas/coronavirus/COVID-19-Guidelines-for-pharmacists-and-the-pharmacy-workforce.pdf, Accessed date, 11 December 2022.
 55. **Lam Ung C. O.** Community pharmacist in public health emergencies: quick to action against the coronavirus 2019-nCoV outbreak. *Res. Soc. Adm. Pharm.* 2020; 16, 583–586.
 56. **Mináriková D.** Level and Factors Influencing the Patient's Satisfaction with the Pharmaceutical Care in Slovakia. *Čes. slov. Farm.* 2015; 64, 178–183.
 57. **Glembotskaya G. T., Bakhareva A. V., Kalinina A. S., Eremin, S. Y., Spichak, I. V., Boyko, E. V.** Reasons of taking medico-social for adaptation of regional medicine supply systems to personalized pharmaceutical care of different age groups. *Int. J. Pharm. Res.* 2019; 11, 1589–1595.