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Review

Pharmacists prescribe: hopes and challenges in modern healthcare management.

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Abstract: From the very beginning, pharmacists have played important roles in health care management worldwide. Besides the pharmaceutical industry, hospital and clinical pharmacy dispensing systems can play an important role in prescription service, especially in low- and middle-income countries where the number of physicians is much less than the World Health Organization's recommendation according to population size. To date, besides physicians, many trained pharmacists in some developed countries are devoted to direct prescription services. People in a fragile health care system suffer a lot. It is due to their very limited healthcare professionals, low monetary backup, and inadequate healthcare institutions. This article cites examples of pharmacist prescribers from some countries around the world and sketches their promising role in the health sector, including the necessity of pharmacist prescribers in modern health care management. Additionally, the potential challenges for the implementation of pharmacist prescriptions have also been depicted in this paper.

Keywords: Health management; Pharmacy prescription service; Independent prescriber

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1. Introduction

Healthcare around the world, especially for the underprivileged, is in crisis. For every 100,000 people, the USA and UK have 295 and 280 actively licensed physicians, respectively. The World Health Organization (WHO) recommends at least one physician for every 1,000 people in a country. But this policy does not exist in many countries around the world. For example, there is only one physician for every 1,800 people in India and 1,887 people in Bangladesh. In the last country, only one government physician existed for 6,579 people. Current evidence suggests that pharmacist prescribers are an essential part of improved medication management [1]. It is evident that a doctor-pharmacist surgical team for certain critical issues, such as venous thromboembolism, might be helpful to manage effectively [2].

Pharmacists are an important part of a health care system. For example, pharmacist prescribers can play major roles in controlling and properly managing the use of over-the-counter (OTC) drugs [3]. Pharmacists, as non-medical prescribers, can be good helpers in underprivileged health management [4]. Thus, pharmacists have important roles in health promotion, disease management, and medication review, with in-depth training in pharmacology, clinical therapeutics, and patient care skills that are at present significantly underused. This paper aims to sketch a hopeful perspective on the training and utilization of pharmacists in prescription service, especially in fragile healthcare systems. Major challenges in this setting are also demonstrated in this paper.

2. Findings with discussion

2.1 Pharmacy prescription services

Prescribing medications is not a simple task; it requires significant expertise to apply medication therapy skills, but that is a type of expertise that pharmacists can develop. For a long time, prescriptions were usually confined to doctors and dentists. Non-medical prescription models have been introduced in various countries around the world to advance healthcare policy formulation and practice [5]. This approach is most commonly observed in England. In 2015, 3845 pharmacists made their debut in England as supplementary and independent prescribers. It should also be noted that, in 2017, about 40% of pharmacists were registered as prescribers by the General Pharmaceutical Council of Scotland. The country aims to have all pharmacists handling patients directly by 2023 as clinical pharmacists and independent prescribers. In the United States, skilled pharmacists can conduct patient assessments, order drug therapy-related laboratory tests, administer medications, and select, initiate, monitor, continue, and coordinate medications. The Canadian legislation allows pharmacists to prescribe according to their skills [6].

According to the New Zealand Pharmacy Council, pharmacists work with other healthcare professionals (e.g., doctors, nurses) as prescribers even though they are not primary diagnosticians [7]. In this case, the pharmacist stops or maintains the therapy started by another prescriber in addition to the new prescription for the patients in order to start or correct the therapy [8]. Besides, assessing the diseases and patients, they work on a wide range of other issues, including overall medical intervention, such as investigating orders and interpretations (laboratory and laboratory experimentation-related); providing education and advice to patients regarding their medication therapy, and so on.

2.2 Safety and effectivity of pharmacist prescribes

Many countries around the world also have additional evidence of the effectiveness and safety of pharmacist prescriptions. According to a recently published Cochrane review of 46 surveys (with 37,337 participants), pharmacists' prescriptions compared to those of medical prescribers were found effective at a desired level [9]. Recently, the Prescription Safety Assessment in England has found unprecedented

success in prescriptions made by Scottish pharmacists, which might be able to support pharmacist prescriptions around the world [10].

The number of drugs available to treat diseases and their simultaneous complications is also increasing rapidly. Pharmacists are not only involved in medication reviews and disease management; they can also play a key role in optimizing drug administration, improving patient care continuity, and informing patients about medication. Now the question is: if pharmacists are given the prescribing opportunity, will there be any problem with other pharmaceutical responsibilities, such as in pharmaceutical companies, hospitals, or polypharmacy? As a pharmacist, I would say 'no' because there is division-wise expertization in pharmacy education. Universities around the world are currently producing a record number of pharmacists with greater efficiency; pharmacy education is prevalent in all types of economies [11]. Moreover, they can work in a team with other healthcare professionals for this purpose. A summary of different pharmacist prescribing models is shown in **Table 1**.

Table 1. Some pharmacy prescribing models are available around the world

Country	**Prescribing model**	**Description**
USA	Dependent	The state law favors this model. The shared responsibility has been described through collaborative drug therapy management.
	Independent	The federal law favors this model. Prescribe all drugs without the supervision of another health care professional.
UK	Supplementary	Prescribe for a diagnosed condition within the agreement set out with the independent prescriber and the patient in a clinical management plan.
	Independent	Prescribe any drug independently, whether for a diagnosed or undiagnosed condition, without the need for a clinical management plan or partnership with an independent prescriber.
Canada	Dependent or delegate	Most of the provinces favor this model. Prescribe based on a collaborative therapy agreement with a physician.
	Independent	Prescribe without a collaborative agreement, limited mainly to emergency contraception.
South Africa	Prescription only medication at pharmacist's own discretion	Make medicine more accessible to rural communities. This model has been withdrawn and is not currently in place, though its status is being reviewed.

Australia	Structured and Independent	There are no regulatory barriers to prescribing in a collaborative healthcare environment. Requires changes in state and territory medicine and poison legislation.
	Autonomous	Still under development.
Scotland	Independent (Clinical)	Still under development.

2.3 Prescription checking

Although the issue of double-checking prescriptions by pharmacists is still controversial, it's true that pharmacists consider their roles in medication safety as pivotal, as they have performed a "first' or 'second' check on prescribing by other health care practitioners to rational drug therapies for decades; therefore, prescription contradictions by pharmacists are inevitable [12]. Once the practice is introduced, only pharmacists with advanced training will be able to guide other pharmacists, which would be a groundbreaking step in favor of the pharmaceutical profession as it would pave a bolder path for the career of pharmacists. There will also be one more team of the front-runners to manage medication and patient care [13]. reported that collaborative and supplementary prescribing (SP) may be the most supported models for pharmacist prescribing frameworks in Qatar. One study reports that pharmacists play an important role in prescription correction in clinical settings in Canada [14].

2.4 Independent prescription service

Pharmacists can play a special role in epidemic infections, for example, in the novel coronavirus disease 2019 (Covid-19). In general, many diseases, including certain infectious diseases, remain great challenges for health workers, including physicians and nurses. It is due to some unavoidable challenges, including drug usage among the people, the heavy workload of physicians and other healthcare providers, high treatment costs, irregular health checkups, a lack of monetary backup, and poor health consciousness among the people. Pharmacists have a wide range of ideas about drug efficacy, mechanisms, side effects, contraindications, etc.; therefore, they might be a potential weapon in this current situation [15]. The effectiveness of teams consisting of doctors, pharmacists, and nurses, depending on the time and situation, finds suitable platforms for exchanging necessary information, making it easier to deal with any complex situation, including investigational trials [16, 17]. Studies suggest that independent pharmacist prescribers can be effectively used in primary, secondary, and tertiary care [18, 19, 20]. A review suggests that patients' responses regarding pharmacist prescribing are significantly positive [21]. One study reports that community pharmacists efficiently screened women (n = 195) for safe use of hormonal contraceptives and selected appropriate products. This report demonstrates that the patients (women) were satisfied with the services, and they wanted to pay for them [22, 23]. A number of studies report that pharmacist prescribers can efficiently prescribe oral contraceptives

and hormonal products [24, 25]. In clinical settings, pharmacist service was relevant and timely, which was helpful for the oral communication between the patients and pharmacists, especially to solve drug-related problems [26]. Thus, patient preference for pharmacist-prescribed medications is increasing day by day [27, 28]. Moreover, pharmacists are evidently playing vital roles in non-medical prescriptions in some countries [5].

2.5 Supplementary prescription (SP) service

Earlier reports demonstrate that in the UK, SP by non-medical prescribers had already been introduced [29]. In this case, a tripartite agreement between the independent medical prescriber, the dependent prescriber, and the patient has been developed. SP is implemented mainly in patient-specific clinical management plans [30, 31]. However, some physicians and patients suggest that pharmacist prescribers need adequate training to be competent prescribers for successful exploration for this purpose [32, 33].

2.6 Prescription in critical care

Prescribing practices during clinical investigations might be helpful to improve the prescribing capability of pharmacists and thereby promote health-related quality of life among the population [34, 35]. For example, pharmacist prescribers can be useful to manage certain critical situations, such as the opioid crisis [36]. Thus, pharmacist prescribers might be helpful to manage addiction cases among people [37].

2.7 Prescription for online care and ambulatory services

Prescriber pharmacists can effectively take part in online care. It is because they can solve the use of OTC medications or self-prescribing behaviors, irrational usage of medication, patient incompliance, and many other minor and large issues related to therapies among the people. Therefore, for digital healthcare services, pharmacist prescribers might be a potential choice [38, 39]. Moreover, pharmacist prescriptions are also applicable for the ambulatory care service as they can efficiently manage adverse drug reactions, improve quality of life, and cut down on therapeutic costs [40, 41].

2.8 Prescription validation checking

Instructions for medication usage given to patients should be accurate and precise. It is because any deviation may lead to serious health problems. Thus, a prescription validation system might be a good option to avoid such problems. Earlier reports suggest that computerized prescription validation systems might be helpful for this purpose [42]. Pharmacists in hospital settings can reduce errors in the selection, prescription, validation, and dispensing of drugs to patients effectively [43]. Pharmacists using the tech-check-tech strategy also found it helpful to reduce prescription errors in community settings [44].

2.9 Major challenges for pharmacist prescribers

Although pharmacists are a potential option for prescription service, their involvement for this purpose is challenging for the below-mentioned reasons.

2.9.1 Education and training

Many low- and middle-income countries (LMICs) still need to upgrade their pharmacy education systems, especially in pharmacy colleges and universities. We can easily see the differences in education, training, and practice, and thus in acquired knowledge and skills, between the pharmacists of a developed country and those of a LMIC. PharmD programs with adequate theory and laboratory courses and proper industrial and hospital training facilities have been successfully implemented in most of the developed countries, while most LMICs are still following a four-year honors program and/or a one-year general master's program. In the latter case, the syllabus and curriculum are developed so tightly that the programs are unable to meet the requirements of industrial and hospital pharmacist standards. Therefore, proper education and training programs accomplished with international standards are crucial for the quality of prescriber pharmacists in LMICs.

2.9.2 National policy and regulations

Policies and regulations of the particular health ministry of a country play important roles in its health sector. An ideal health ministry should have well-structured provisions regarding population health. Therefore, it should provide adequate budgetary support to manage all private and public health sectors within the state. A successful health ministry will be able to understand the necessity of quality health education and the implementation of pharmacists in hospitals and clinics. It should take all necessary actions for proper education, training, and employment of pharmacists, like other health professionals in the country. Adequate quality pharmacy colleges and universities with standard facilities should be ensured for pharmacy education and training.

2.9.3 Accreditation facility from the pharmacy council

The pharmacy council is responsible for checking and maintaining the overall quality of pharmacy education in a country. Therefore, it should implement strict rules and regulations for pharmacy education and training institutions. For this, it should preserve all ethical rights for proper accreditation policies regarding pharmacy practice in a country.

2.9.4 Liability and logistics

For this reason, pharmacist prescribers should be actively motivated and confident that they can do their duties properly. They should follow all rules and regulations of the institutions regarding the prescription issue. They should receive proper training before prescribing. They should actively participate in adequate clinical trials

to understand the overall facts of a prescription service and find out the solutions for all minor and major challenges regarding this issue.

2.9.5 Reimbursement and documentation

Proper registration or licensing of the trained pharmacists nominated for the prescription service in a clinical setting is essential. Therefore, national documentation policies should be strict for this purpose. People from the LMICs are frequently victims of fraud by medical practitioners. Thus, proper monitoring and control of fraud in the registration and licensing sections for pharmacists are extremely needed.

2.9.6 Cooperation and attitudes of the patients and other healthcare providers

The impact of cooperation and support from patients and other healthcare providers is a vital issue for the implementation of pharmacist prescribers in hospitals, clinics, and community and chain pharmacy settings. Patient education and counseling programs may play pivotal roles in this. Physicians and trained pharmacists and nurses can be directly or indirectly involved in education and training for pharmacist prescription programs. This will reduce antithetical conflicts among all kinds of healthcare providers and facilitate effective pharmaceutical care in a country.

3. Conclusions

Taken together, pharmacists might be a potential option to handle modern health challenges. In LMICs, especially where the number of medical prescribers is low, pharmacist prescribers may be a good tool to make up for the deficit. However, issues relating to the practical implementation of pharmacist prescribers include the national health policy of the country, special training and accreditation from the pharmacy council, liability, reimbursement, and documentation.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Nguyen, A.D.; Lam, A.; Banakh, I.; Lam, S.; Crofts, T. Improved medication management with introduction of a perioperative and prescribing pharmacist service. *Journal of Pharmacy Practice* **2020**, *33*(3), 299-305.
2. Hale, A.; Merlo, G.; Nissen, L.; Coombes, I.; Graves, N. Cost-effectiveness analysis of doctor-pharmacist collaborative prescribing for venous thromboembolism in high risk surgical patients. *BMC Health Services Research* **2018**, *18*, 1-6.
3. Hong, S.H.; Spadaro, D.; West, D.; Tak, S.H. Patient valuation of pharmacist services for self care with OTC medications. *Journal of Clinical Pharmacy and Therapeutics* **2005**, *30*(3), 193-9.
4. Ahmad, Z.M.; Noel, N.L.; Rudd, T.M.; Nadelson, C.S.; Ott, M.A.; Wilkinson, T.A.; Meredith, A.H. Implementation of a pharmacist-led hormonal contraceptive prescribing service in a campus community pharmacy in Indiana, United States. *Contraception* **2022**, *113*, 113-8.
5. Mills, T.; Patel, N.; Ryan, K. Pharmacist non-medical prescribing in primary care. A systematic review of views, opinions, and attitudes. *International Journal of Clinical Practice* **2021**, *75*(3), e13827.
6. Jebara, T.; Cunningham, S.; MacLure, K.; Awaisu, A.; Pallivalapila, A.; Stewart, D. Stakeholders' views and experiences of pharmacist prescribing: a systematic review. *British Journal of Clinical Pharmacology* **2018**, *84*(9), 1883-1905.

7. Shaw, J.P.; Print, S.A.; Duffull, S.B. Development of a postgraduate educational program for pharmacist prescribers in New Zealand. *Journal of Pharmacy Practice and Research* **2013**, *43*(2), 122-7.
8. Cooper, R.; Anderson, C.; Avery, T.; Bissell, P.; Guillaume, L.; Hutchinson, A.; Lymn, J.; Murphy, E.; Ratcliffe, J.; Ward, P. Stakeholders' views of UK nurse and pharmacist supplementary prescribing. *Journal of Health Services Research & Policy* **2008a**, *13*(4), 215-21.
9. Weeks, G.; George, J.; Maclure, K.; Stewart, D. Non-medical prescribing versus medical prescribing for acute and chronic disease management in primary and secondary care. *Cochrane Database of Systematic Reviews* **2016**, *11*, CD011227.
10. Reid, F.; Power, A.; Stewart, D.; Watson, A.; Zlotos, L.; Campbell, D.; McIntosh, T.; Maxwell, S. Piloting the United Kingdom 'Prescribing Safety Assessment'with pharmacist prescribers in Scotland. *Research in Social and Administrative Pharmacy* **2018**, *14*(1), 62-8.
11. Hughes, C.A.; Breault, R.R.; Hicks, D.; Schindel, T.J. Positioning pharmacists' roles in primary health care: a discourse analysis of the compensation plan in Alberta, Canada. *BMC Health Services Research* **2017**, *17*, 770.
12. Bao, Z.; Ji, C.; Hu, J.; Luo, C.; Fang, W. Clinical and economic impact of pharmacist interventions on sampled outpatient prescriptions in a Chinese teaching hospital. *BMC Health Services Research* **2018**, *18*, 519.
13. Diab, M.I.; Ibrahim, A.; Abdallah, O.; El-Awaisi, A.; Zolezzi, M.; Ageeb, R.A.; Elkhalifa, W.H.I.; Awaisu, A. Perspectives of future pharmacists on the potential for development and implementation of pharmacist prescribing in Qatar. *International Journal of Clinical Pharmacy* **2020**, *42*(1), 110-23.
14. Stasiak, P.; Afilalo, M.; Castelino, T.; Xue, X.; Colacone, A.; Soucy, N.; Dankoff, J. Detection and correction of prescription errors by an emergency department pharmacy service. *Canadian Journal of Emergency Medicine* **2014**, *16*(3), 193-206.
15. Visacri, M.B.; Figueiredo, I.V.; Lima, T.M. Role of pharmacist during the COVID-19 pandemic: A scoping review. *Research in Social and Administrative Pharmacy* **2020**. doi: 10.1016/j.sapharm.2020.07.003
16. Rigby, D. Collaboration between doctors and pharmacists in the community. *Australian Prescriber* **2010**, *33*(6), 191-3.
17. Latter, S.; Smith, A.; Blenkinsopp, A.; Nicholls, P.; Little, P.; Chapman, S. Are nurse and pharmacist independent prescribers making clinically appropriate prescribing decisions? An analysis of consultations. *Journal of Health Services Research & Policy* **2012**, *17*(3), 149-56.
18. Mansell, K.; Bootsman, N.; Kuntz, A.; Taylor, J. Evaluating pharmacist prescribing for minor ailments. *International Journal of Pharmacy Practice* **2015**, *23*(2), 95-101.
19. Bourne, R.S.; Baqir, W.; Onatade, R. Pharmacist independent prescribing in secondary care: opportunities and challenges. *International Journal of Clinical Pharmacy* **2016**, *38*, 1-6.
20. Grant, A.; Trenaman, S.; Stewart, S.; Liu, L.; Fisher, J.; Jeffers, E.; Lawrence, R.; Murphy, A.; Sketris, I.; Woodill, L.; Isenor, J.E. Uptake of community pharmacist prescribing over a three-year period. *Exploratory Research in Clinical and Social Pharmacy* **2023**, *9*, 100221.
21. Famiyeh, I.M.; McCarthy, L. Pharmacist prescribing: a scoping review about the views and experiences of patients and the public. *Research in Social and Administrative Pharmacy* **2017**, *13*(1), 1-6.
22. Gardner, J.S.; Downing, D.F.; Blough, D.; Miller, L.; Le, S.; Shotorbani, S. Pharmacist prescribing of hormonal contraceptives: results of the Direct Access study. *Journal of the American Pharmacists Association* **2008**, *48*(2), 212-26.
23. Lu, S.; Rafie, S.; Hamper, J.; Strauss, R.; Kroon, L. Characterizing pharmacist-prescribed hormonal contraception services and users in California and Oregon pharmacies. *Contraception* **2019**, *99*(4), 239-43.
24. Rodriguez, M.I.; McConnell, K.J.; Swartz, J.; Edelman, A.B. Pharmacist prescription of hormonal contraception in Oregon: Baseline knowledge and interest in provision. *Journal of the American Pharmacists Association* **2016**, *56*(5), 521-6.
25. Frost, T.P.; Klepser, D.G.; Small, D.C.; Doyle, I.C. Time and motion study of pharmacist prescribing of oral hormonal contraceptives in Oregon community pharmacies. *Journal of the American Pharmacists Association* **2019**, *59*(2), 222-7.

26. Nielsen, T.R.; Andersen, S.E.; Rasmussen, M.; Honoré, P.H. Clinical pharmacist service in the acute ward. *International Journal of Clinical Pharmacy* **2013**, *35*, 1137-51.
27. Tinelli, M.; Ryan, M.; Bond, C. Patients' preferences for an increased pharmacist role in the management of drug therapy. *International Journal of Pharmacy Practice* **2009**, *17*(5), 275-82.
28. Famiyeh, I.M.; MacKeigan, L.; Thompson, A.; Kuluski, K.; McCarthy, L.M. Exploring pharmacy service users' support for and willingness to use community pharmacist prescribing services. *Research in Social and Administrative Pharmacy* **2019**, *15*(5), 575-83.
29. Hobson, R.J.; Sewell, G.J. Supplementary prescribing by pharmacists in England. *American Journal of Health-System Pharmacy* **2006**, *63*(3), 244-53.
30. Tonna, A.P.; Stewart, D.; West, B.; McCaig, D. Pharmacist prescribing in the UK–a literature review of current practice and research. *Journal of Clinical Pharmacy and Therapeutics* **2007**, *32*(6), 545-56.
31. Cooper, R.J.; Anderson, C.; Avery, T.; Bissell, P.; Guillaume, L.; Hutchinson, A.; James, V.; Lymn, J.; McIntosh, A.; Murphy, E.; Ratcliffe, J. Nurse and pharmacist supplementary prescribing in the UK—a thematic review of the literature. *Health Policy* **2008b**, *85*(3), 277-92.
32. Stewart, D.C.; George, J.; Bond, C.M.; Diack, H.L.; McCaig, D.J.; Cunningham, S. Views of pharmacist prescribers, doctors and patients on pharmacist prescribing implementation. *International Journal of Pharmacy Practice* **2009**, *17*(2), 89-94.
33. Kelly, D.V.; Young, S.; Phillips, L.; Clark, D. Patient attitudes regarding the role of the pharmacist and interest in expanded pharmacist services. *Canadian Pharmacists Journal/Revue des Pharmaciens du Canada* **2014**, *147*(4), 239-47.
34. Bladh, L.; Ottosson, E.; Karlsson, J.; Klintberg, L.; Wallerstedt, S.M. Effects of a clinical pharmacist service on health-related quality of life and prescribing of drugs: a randomised controlled trial. *BMJ Quality & Safety* **2011**, *20*(9), 738-46.
35. Tan, E.C.; Stewart, K.; Elliott, R.A.; George, J. Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. *Research in Social and Administrative Pharmacy* **2014**, *10*(4), 608-22.
36. Thakur, T.; Frey, M.; Chewning, B. Pharmacist services in the opioid crisis: current practices and scope in the United States. *Pharmacy* **2019**, *7*(2), 60.
37. Hill, D.R.; Conroy, S.; Brown, R.C.; Burt, G.A.; Campbell, D. Stakeholder views on pharmacist prescribing in addiction services in NHS Lanarkshire. *Journal of Substance Use* **2014**, *19*(1-2), 56-67.
38. Harvey, J.; Avery, A.J.; Waring, J.; Barber, N. The socio-technical organisation of community pharmacies as a factor in the Electronic Prescription Service Release Two implementation: a qualitative study. *BMC Health Services Research* **2012**, *12*, 1-2.
39. Aldughayfiq, B.; Sampalli, S. Digital health in physicians' and pharmacists' office: a comparative study of e-prescription systems' architecture and digital security in eight countries. *Omics: A Journal of Integrative Biology* **2021**, *25*(2), 102-22.
40. Tully, M.P.; Seston, E.M. Impact of pharmacists providing a prescription review and monitoring service in ambulatory care or community practice. *Annals of Pharmacotherapy* **2000**, *34*(11), 1320-31.
41. Dalton, K.; Byrne, S. Role of the pharmacist in reducing healthcare costs: current insights. *Integrated Pharmacy Research and Practice* **2017**, *25*, 37-46.
42. Ishizuka, H.; Hara, S.; Ishikura, C. Computerized prescription checking system. *International Journal of Bio-medical Computing* **1986**, *19*(3-4), 195-200.
43. Vélez-Díaz-Pallarés, M.; Delgado-Silveira, E.; Carretero-Accame, M.E.; Bermejo-Vicedo, T. Using healthcare failure mode and effect analysis to reduce medication errors in the process of drug prescription, validation and dispensing in hospitalised patients. *BMJ Quality & Safety* **2013**, *22*(1), 42-52.

44. Frost, T.P.; Adams, A.J. Tech-check-tech in community pharmacy practice settings. *Journal of Pharmacy Technology* **2017**, *33*(2), 47-52.

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