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Impact of integrating pharmacists into primary care teams on health systems indicators:

a systematic review

Abstract

Background
Evidence suggests that pharmacists integrated into primary care can improve patient outcomes and satisfaction, but their impact on healthcare systems is unclear.

Aim
To identify the key impacts of pharmacists' integration into primary care on health system indicators, such as healthcare utilisation and costs.

Design and setting
A systematic review of literature.

Method
Embase, MEDLINE, Scopus, the Health Management Information Consortium, CINAHL, and the Cochrane Central Register of Controlled Trials databases were examined, along with reference lists of relevant studies. Randomised controlled trials (RCTs) and observational studies published up until June 2018, which considered health system outcomes of the integration of pharmacists into primary care, were included. The Cochrane risk of bias quality assessment tool was used to assess risk of bias for RCTs; the National Institute of Health National Heart, Lung, and Blood Institute quality assessment tool was used for observational studies. Data were extracted from published reports and findings synthesised.

Results
Searches identified 3058 studies, of which 28 met the inclusion criteria. Most included studies were of fair quality. Pharmacists in primary care resulted in reduced use of GP appointments and reduced emergency department (ED) attendance, but increased overall primary care use. There was no impact on hospitalisations, but some evidence of savings in overall health system and medication costs.

Conclusion
Integrating pharmacists into primary care may reduce GP workload and ED attendance. However, further higher quality studies are needed, including research to clarify the cost-effectiveness of the intervention and the long-term impact on health system outcomes.

Keywords
family practice; general practice; pharmacists; primary health care; workload.

INTRODUCTION

Increasingly unmanageable workloads in primary care[1] makes the recruitment and retention of GPs challenging.[2] Despite government promises,[3] having an adequately sized GP workforce seems unlikely to be realised in the near future;[4,5] consequently, new models of care need to be considered.

The pharmacist's role has evolved beyond dispensing medications, with community pharmacists providing various services such as smoking cessation and weight management.[6] However, as a growing workforce[7] with a range of skills applicable to primary care, pharmacists remain underutilised. Working in primary care teams, pharmacists can:

- improve prescribing safety;[8,9]
- support clinical staff in medication audit;
- manage repeat prescriptions; and
- provide medicines information.[10]

They also have a role in other patient-facing aspects of primary care, including chronic disease management and the treatment of minor illnesses.[11,12]

Previous systematic reviews have considered clinical and patient outcomes, such as blood pressure control and patient satisfaction,[11,13] but the impact of pharmacists based in primary care on health systems remains unclear. One review examined pharmacists' impact on health systems, but did not focus specifically on primary care;[14] an older review included community pharmacists rather than only those in primary care practices.[15]

The authors sought to understand the impact of integrating pharmacists into primary care teams on health systems indicators, specifically those of utilisation and costs.

METHOD

A systematic review was conducted in line with recommendations in the *Cochrane Handbook for Systematic Reviews of Interventions*[16] and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement.[17]

Search strategy

The electronic databases Embase, MEDLINE, Scopus, CINAHL, Health Management Information Consortium (HMIC), and Cochrane Central Register of Controlled Trials (CENTRAL) were searched for articles published between 1947 and June 2018. Medical Subject Headings (MeSH) were used where appropriate. A previous review[11] helped to guide the searches. Search terms are available from the authors on request.

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How this fits in

Evidence shows that pharmacists working in primary care teams can improve clinical outcomes and increase patients' level of satisfaction with their care. However, pharmacists' impact on healthcare system-related outcomes is unclear. This review indicates that pharmacists integrated into primary care may reduce the number of GP appointments needed, as well as emergency department attendance; however, they appear to increase primary care use overall. Further research is needed to establish the long-term impact of the integration of pharmacists at scale.

Eligibility criteria

Randomised controlled trials (RCTs) and observational studies were included, in which pharmacists regularly delivered non-dispensing services to individual patients face to face, by telephone, or by screening their medications while in a primary care practice. Studies in which community pharmacists provided a service remotely were excluded. Studies were required to compare the presence and absence of a pharmacist, either by a control group or a baseline comparison.

Only studies examining health system outcomes were included. These are reflected in the NHS pharmacists in primary care pilot,[18] which considers healthcare utilisation and costs. Studies published in languages other than English were excluded.

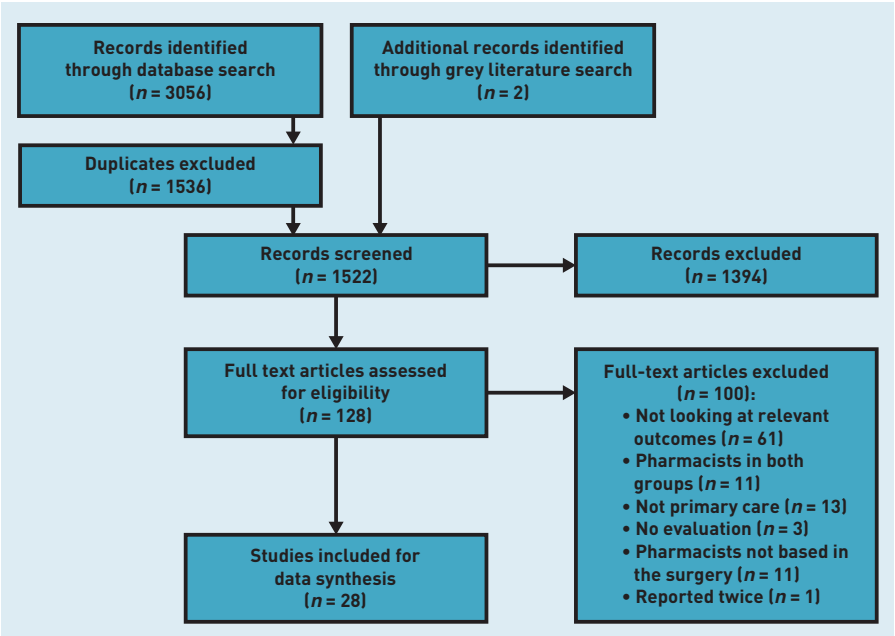

Figure 1. PRISMA flowchart: study inclusion.

Study selection

Following deduplication, titles and abstracts were screened independently by two authors, before full-text screening against the inclusion criteria was conducted. Disagreements were resolved by consensus with two further authors.

Data items, collection, and extraction

Data were extracted on outcomes relating to:

- healthcare use: GP visits, medications, hospitalisations, and ED use; and
- healthcare cost: overall healthcare expenditure, medication costs, and hospitalisation and ED visit costs.

Risk of bias assessment

For RCTs, the Cochrane risk of bias quality assessment tool was used;[19] the National Institute of Health National Heart, Lung, and Blood Institute quality assessment tool for observational cohort and cross-sectional studies was used for observational studies.[20] Assessment was carried out by the two authors who screened the title and abstracts, and 10 papers were assessed for standardisation by the two authors who resolved the issues of consensus.

Data extraction and synthesis

Due to the heterogeneous nature of the included studies, meta-analysis was not possible. Descriptive narrative synthesis was used to draw conclusions from extracted data on the effects on the health system of integrating pharmacists into primary care.

RESULTS

Characteristics of included studies

Searches identified 3058 studies; of these, 28 were included for data synthesis (Figure 1). Table 1 summarises the characteristics of included studies. These were conducted between 1987 and 2018, and recruited more than 32 000 patients. Fourteen studies were from the US,[21–34] four from Canada,[35–38] five from the UK,[39–43] one from Sweden,[44] one from Spain,[45] two from Brazil,[46,47] and one from Singapore.[48] Two studies[40,41] were further analyses performed on data from previous studies; the original studies[49,50] had no distinct findings on the relevant outcomes, so only the subsequent analyses were included in the final 28 studies. Another two included studies[37,38] were analyses of the same study, but considered

Table 1. Characteristics and key findings of included studies

Author(s)	Year	Country	Study design	Sample size	Population/sample demographic	Health system outcome(s)	Key findings/conclusions
Borenstein *et al*[32]	2003	US	Randomised comparative trial	197	Patients aged >18 years with uncontrolled hypertension with capitated health insurance recruited from two primary care offices	Primary care visits, primary care costs, medication costs	Physician–pharmacist comanagement for patients with uncontrolled hypertension resulted in improved BP control and reduced primary care physician visit rates, and reduced average visit costs per patient.
Britton and Lurvey[28]	1991	US	RCT	572	Patients registered at a primary care medical centre who were receiving ≥5 prescription or non-prescription medications	Number of medications, medication costs, medical supplies	Medication profile review by a clinical pharmacist statistically significantly reduced both the number and the cost of drugs for patients receiving ≥5 medications
Brunisholz *et al*[33]	2018	US	Retrospective observational study	1358	Patients with high BP and/or diabetes mellitus within a primary healthcare network	Hospitalisations, ED visits. primary care visits, specialty visits	Pharmacist intervention was associated with improved disease management, but statistically significantly increased visits to primary care, specialty care, care managers (registered nurse), and the ED
Bush *et al*[43]	2018	UK	Retrospective observational study	5.4 WTE pharmacists	Clinical pharmacists within 49 GP practices in Dudley CCG	Primary care visits, healthcare costs	In a 4-month period, pharmacists saved 628 GP appointments, 647 GP hours in medication review/repeat prescribing and led to a total savings of approximately £1.5 million
Campins *et al*[45]	2017	Spain	RCT	503	Community-dwelling polymedicated (>8 drugs) older people (aged >70 years)	Number of medications, primary care visits, ED visits, hospitalisations, medication costs, healthcare costs	Intervention reduced medication use by 5% with no observed health risks. There were more primary care visits with the intervention (difference became non-significant at 12 months), but no differences in ED visits or hospitalisations. The intervention led to a 7% reduction in medication costs
Finley *et al*[27]	2003	US	RCT	125	Patients registered at a primary care medical centre, recently started on antidepressants for depressive symptoms	Primary care visits, ED visits, healthcare use, medication costs	Clinical pharmacists had a favourable effect on multiple aspects of patient care, but did not show a statistically significant difference in resource use
Harris *et al*[30]	2009	US	Prospective observational cohort study	92	Patients registered at a university based family medicine clinic, had ≥5 medications, multiple medical conditions, and/or medical conditions that resulted in high use of health care	Number of medications	Medication therapy review and intervention by pharmacist resulted in a small reduction in average number of medications per patient
Hirsch *et al*[21]	2014	US	Randomised pragmatic trial	166	Patients with uncontrolled hypertension registered at a university-based general medicine clinic	Primary care visits	Pharmacist intervention was more effective at lowering BP than usual care, and associated with fewer primary care physician visits
Hunt *et al*[22]	2008	US	RCT	463	Patients with uncontrolled hypertension registered at one of nine primary care clinics within a primary care research network	Primary care visits, number of medications, use of generic medications	Patients with pharmacist hypertension management had more total primary care visits, but fewer primary care physician visits. Intervention patients were statistically significantly more likely to be prescribed generic antihypertensive medications but there was no statistically significant effect on overall pill burden
Lenander *et al*[44]	2014	Sweden	RCT	209	Patients registered at a large primary care centre, aged ≥65 years with ≥5 different medications	Hospitalisations, primary care visits, number of medications	Pharmacist intervention resulted in reduction in the number of drugs per patient

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Table 1 continued. Characteristics and key findings of included studies

Author(s)	Year	Country	Study design	Sample size	Population/sample demographic	Health system outcome(s)	Key findings/conclusions
Lowrie *et al*[39]	2012	UK	Cluster-randomised controlled, event driven, trial	2164	Patients registered at 174 NHS general practices. Eligible patients were aged ≥18 years and had left ventricular systolic dysfunction confirmed by cardiac imaging	Hospitalisations	A pharmacist intervention resulted in modest improvements in the prescribing of disease-modifying medications. There was no difference in hospitalisation between groups
Mourão *et al*[47]	2013	Brazil	RCT	100	Patients registered at six public health system primary care centres, aged ≥18 years, using oral antidiabetic medications, and had presenting HbA1c levels of ≥7%	Number of medications	The number of drugs taken by the control group remained the same, while the intervention group showed a statistically significant increase
Neilson *et al*[40]	2015	UK	Pilot RCT	125	Patients registered at six general practices, aged ≥18 years, and receiving regular prescribed medication for pain	Primary care visits, specialist visits, hospitalisations, medication costs, specialist visit costs, hospitalisation costs, primary care costs	Pharmacist-led intervention for chronic pain was more costly and provided similar QALYs to treatment as usual
Obreli-Neto *et al*[46]	2015	Brazil	RCT	200	Patients registered at a primary healthcare unit, aged ≥60 years, diagnosed with diabetes or hypertension, and receiving drug treatment for diabetes or hypertension	Primary care visits, specialist visits, ED visits, number of medications, healthcare cost	Pharmacist intervention was associated with statistically significantly higher GP and specialist visit rates, but statistically significantly lower ED visit rates. There was no difference in overall healthcare costs for intervention and control groups.
Okamoto and Nakahiro[31]	2001	US	Prospective, randomised, comparative study	330	Patients in hypertension and general medicine clinics within a managed care organisation, who were ≥18 years old and diagnosed with hypertension, and taking specified antihypertensive drugs	Number of medications, primary care visits, ED visits, hospitalisations, medication costs, specialist visit costs, ED costs, hospitalisation costs	There were more primary care visits in the pharmacist managed group, with associated higher visit costs. There were four ED visits in the control group, and none in the pharmacist group. BP measurements were statistically significantly lower in the pharmacist-managed group with cost-effectiveness ratios for BP mangement lower in the pharmacist intervention group.
Phelan *et al*[41]	2008	UK	RCT	106	Patients aged ≥55 years registered with one of 15 participating general practices, who consulted their GP with pain, stiffness, or both in one or both knees	Medication costs	Pharmacists can make a positive contribution to the management of patients with knee pain in primary care; pharmacist intervention may reduce medication-related costs
Price-Haywood *et al*[34]	2017	US	Retrospective observational study	5044	Adult patients (>18 years) with diabetes and/or hypertension who attended a community health centre	Primary care visits	Patients who saw a pharmacist within the collaborative care model saw their primary care provider more often. The intervention did not lead to any differences in BP or glucose control
Ragucci *et al*[26]	2005	US	1-year observational study	191	Patients with diabetes at three university-based primary care clinics	Healthcare costs	Pharmacists achieved significant improvements in HbA1c values, BP, and aspirin use. Statistically significant cost avoidance was calculated based on HbA1c reductions
Roth *et al*[29]	2013	US	Prospective, observational pilot study	64	Patients registered at a community-based primary care medical practice, aged ≥65 years, who were taking at ≥5 medications	Hospitalisations, ED visits	A pharmacist intervention resulted in a statistically significant reduction in medication-related problems, and a non-significant reduction in acute health services use

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Table 1 continued. Characteristics and key findings of included studies

Author(s)	Year	Country	Study design	Sample size	Population/sample demographic	Health system outcome(s)	Key findings/conclusions
Rothman *et al*[23]	2005	US	RCT	217	Patients registered at a university general internal medicine practice with type 2 diabetes and poor glycaemic control (HbA1c level ≥8.0%)	Primary care visits, urgent care visits, hospitalisations	Pharmacist intervention resulted in statistically significant improvement in BP and glycaemic control, but had no statistically significant impact on the use of clinical services
Rudd and Dier[24]	2010	US	Retrospective medical record review	996	Patients registered at 25 outreach primary care health centres, receiving long-term anticoagulation therapy with warfarin	Hospitalisations, ED visits	Pharmacist anticoagulation management services resulted in a statistically significant reduction in rates of anticoagulation-related ED visits and hospitalisations, with financial impact through avoided costs.
Sellors *et al*[35]	2001	Canada	Randomised, observer-blinded, controlled trial	132	Patients aged ≥65 years from four family practices, who were taking ≥4 regular medications	Number of medications, medication costs	Results suggested a statistically non-significant trend towards lower medication costs through face-to-face medication reviews carried out by pharmacists
Sellors *et al*[36]	2003	Canada	RCT	48 family physicians and 889 patients	Patients ≥65 years, taking ≥5 medications, registered in 24 family practices	Number of medications, medication costs, healthcare costs	The intervention did not demonstrate any statistically significant effect on health system outcomes. Physicians were receptive to recommendations on drug-related problems, suggesting feasibility of collaboration between physicians and pharmacists
Siaw *et al*[48]	2017	Singapore	RCT	411	High–risk patients aged ≥21 years with uncontrolled type 2 diabetes, polypharmacy, and comorbidities; registered at four outpatient healthcare institutions	Primary care visits, visit costs, laboratory test costs, medication costs	Pharmacist intervention was associated with fewer physician visits, but slightly higher visit costs due to additional pharmacists visits. Overall healthcare costs were lower with pharmacist intervention, with medication costs the greatest contributor to this reduction.
Simpson *et al*[37]	2011	Canada	RCT	260	Patients with type 2 diabetes registered at five primary care clinics	Healthcare costs, ED visits, hospitalisations, specialist visits, healthcare contacts	Pharmacist intervention was associated with statistically significant increase in healthcare-related contacts, but the majority of these were protocol-driven visits to the pharmacist as part of the intervention
Simpson *et al*[38]	2015	Canada	RCT	123	Patients with type 2 diabetes registered at five primary care clinics	ED visits, hospitalisations, specialist visits, healthcare contacts	Adding pharmacists to primary care teams was a cost-effective strategy for reducing cardiovascular risk in patients with type 2 diabetes
Stergachis *et al*[25]	1987	US	RCT	17 physicians	Two clinical pharmacists working with patients registered in two family practices	Medication costs	Pharmacists were unable to produce statistically significant change in medication costs. This programme was not economically self-sustaining during the first 6 months
Zermansky *et al*[42]	2001	UK	RCT	1188	Patients registered at four general practices, aged ≥65 years, receiving at least one repeat prescription	Number of medications, medication costs, primary care visits, specialist visits, hospitalisations	Monthly medication costs rose less in the pharmacist intervention group. Patients in the intervention group also had a statistically smaller rise in the number of medications prescribed than in the control group.

BP = blood pressure. CCG = clinical commissioning group. ED = emergency department. NHS = National Health Service. QALY = quality-adjusted life year. RCT = randomised controlled trial. WTE = whole-time equivalent.

separate relevant outcomes. Seven studies were observational,[24,26,29,30,33,34,43] and 21 were RCTs.[21–23,25,27,28,31,32,35–42,44–48]

All of the included studies examined pharmacists working in primary care; however, the type of service offered varied,

and can be broadly divided into three categories:

- medication review: the pharmacist reviewed patients' medications and offered suggestions to clinicians;[21–48]
- treatment management: the pharmacist managed patients' treatment, including ordering laboratory tests, seeing patients regularly, and, in some cases, prescribing medication;[21,22,24,26,27,31–34,37,38,40,41,43,46,47] and;
- patient education: the pharmacist educated patients on lifestyle factors or behaviours to improve their health.[21–23,25–27,29,32–34,44,46,47]

Pharmacists in some studies offered more than one of these services. No study compared different pharmacist interventions, so relative impact could not be assessed.

Risk of bias assessment

Five of the seven observational studies were of fair quality;[24,26,29,30,33] the remaining two were of poor quality;[34,43] none provided sample-size justification or blinded outcome assessors. Experimental studies were all of fair overall quality, but all introduced a high risk of bias in failing to blind participants.[21–23,25,27,28,31,32,35–42,44–48] In addition, in all but two studies[36,39] there was contamination between groups, with GPs seeing patients in both the control and intervention groups. Most RCTs did not state whether outcome assessors were blinded to group allocation.

Impact of pharmacists in primary care

The impact of pharmacist integration into primary care on healthcare utilisation and cost is summarised in Table 1. In common with much of the literature, the term 'visit' is used to refer to occasions when patients see health professionals in primary care clinics or hospital departments. Domiciliary visiting was not considered in this review.

Primary care visits

Nine studies assessed the impact of the integration of pharmacists on GP visit rates; [21,22,32,34,40,42,43,46,48] four showed a statistically significant decrease of approximately two GP visits per patient per year with the integration of pharmacists.[21,22,32,48] One UK study[43] reported 628 GP appointments and 647 hours of GP administrative time saved over a 4-month period through the integration of 5.4 whole-time equivalent (WTE) pharmacists across 49 GP practices. Two further studies showed small increases in GP visit rates,[34,46] and two demonstrated no statistically significant difference.[40,42] Of 10 studies considering overall primary care visits,[21–23,27,31–33,40,44,45] including appointments with pharmacists and other primary care professionals, four found an increase in primary care usage following the integration of pharmacists,[22,31,33,45] and one found that pharmacists scheduled nearly four times as many appointments as GPs.[31] The remaining six studies found no statistically difference in overall primary care use.[21,23,27,32,40,44]

Secondary care visits

Six studies assessed the consulting of secondary care professionals (specialist and outpatient department visits).[33,37,38,40,42,46] In one of these, pharmacist intervention was associated with statistically significantly more ambulatory clinical visits, including secondary care visits;[33] another showed a small statistically significant increase in specialist appointments (0.2 versus 0.1 mean visits per patient in intervention and control groups respectively) associated with pharmacist integration.[46] No other significant differences were identified.

Overall healthcare contacts

Three studies assessed overall healthcare contacts,[27,37,38] showing increasing trends in healthcare use with pharmacist intervention. However, this was significant in only one study,[37] in which 78% of contacts were protocol driven or interim follow-up appointments with pharmacists (two-thirds of these interim contacts were by telephone).

Medication use

Eleven studies assessed the number of medications per patient.[22,28,30,31,35,36,42,44–47] Findings were mixed. Two studies showed small statistically significant increases in medications prescribed in pharmacist interventions,[42,47] (in one of these, medications increased in both intervention and control groups, but to a lesser extent with the intervention[42]). Four studies showed small statistically significant decreases in medication use with pharmacist intervention,[28,30,44,45] while the remainder showed no statistically significant effect on overall numbers of medications.[22,31,35,36,46]

Hospitalisation and ED use

Twelve studies assessed the number of hospitalisations or length of stay in hospital,[23,24,29,31,33,37–40,42,44,45] and 10 examined ED visits (including urgent care).[23,24,27,29,31,33,37,38,45,46] Only one study, in which pharmacists managed anticoagulation

in primary care, showed a statistically significant reduction in hospitalisations with pharmacist intervention.[24] No studies reported a statistically significant impact on length of hospital stay. Three studies[24,31,46] showed a significant reduction in ED use with pharmacist intervention, alongside a number with non-significant trends in this direction;[23,27,29,38] one study showed a significant increase in ED use.[33]

Medication costs

Twelve studies examined medication costs,[25,27,28,31,32,35,36,40–42,45,48] with three showing statistically significant decreases in spending on medication,[28,42,45] one suggesting a statistically non significant trend in this direction,[35] and one a statistically smaller increase in spending with pharmacist intervention than with controls.[42] One further study[22] considered prescribing generic versions of medications as a surrogate for a reduction in medication-related costs, showing significantly higher rates of generic prescribing in the pharmacist intervention group.

Primary and secondary care utilisation costs

Ten studies assessed the cost of healthcare utilisation,[26,31,32,36,37,40,43,45,46,48] looking at outcomes including secondary care clinic costs, laboratory tests, and primary care costs. Three identified cost increases associated with pharmacist intervention that related to increased clinic appointments in both primary and secondary care.[31,46,48] However, significant healthcare cost decreases were identified in some studies, including lower average cost per visit,[32,48] less spending on laboratory tests,[48] lower total cost for diabetes care,[48] and reduced GP hours spent on medication review and repeat prescribing:[43] this last study estimated annual cost savings of £1.5 million through the integration of 5.4 WTE pharmacists across 49 GP practices.

Hospitalisation and ED visit costs

Three studies considered hospitalisation costs.[24,31,40] No related outcomes of statistical significance were reported, but Rudd and Dier's study[24] estimated a large saving in hospitalisation avoidance (based on reduced admission rates compared with usual physician care). Two studies assessed ED costs;[24,31] both reported statistically significantly fewer patients attending the ED in the intervention groups and large cost savings were estimated based on these visit frequencies.

DISCUSSION

Summary

Integrating pharmacists into primary care was likely to reduce the number of GP appointments; however, it may have increased the overall use of primary care through relatively frequently scheduled appointments with pharmacists. Pharmacists in primary care did not appear to affect hospitalisations, but their integration was likely associated with fewer ED attendances. Evidence relating to the impact on the number of prescribed medications per patient was mixed but, in a few studies, pharmacist interventions were associated with a reduction in medication-related spending. There was some evidence of a reduction in overall expenditure on both primary and secondary health care, and several studies estimated cost reductions based on decreases in ED use.

Strengths and limitations

This review provides a clearer sense of the potential impact pharmacists in primary care can have on a health system. Both RCTs and observational studies were included, increasing the reliability of the evidence considered as recommended by Concato *et al*.[51] However, included studies were all of fair or poor quality, with several important sources of bias. No study blinded participants to the status of the professionals they consulted, although this would, of course, have been difficult to achieve in practice. Like most literature reviews, it is possible that the one presented here is affected by a degree of publication bias in terms of the studies that were included. For practical reasons, only studies published in English were included, potentially resulting in exclusion bias.

The small numbers of patients involved in many studies make it difficult to draw firm conclusions about the impact on healthcare services. This is particularly the case for those estimating cost savings through hospitalisation or ED visit avoidance. As an example, one study[31] reported no ED visits in the intervention group ($n = 166$), compared with four in the physician-managed group ($n = 164$) over a 6-month period.

Comparison with existing literature

Previous reviews have demonstrated the effectiveness of pharmacists based in primary care practices at improving various clinical outcomes, with most evidence relating to cardiovascular disease, diabetes, and avoidance of drug-related errors.[11] A previous systematic review of pharmacist services in primary care in low- and

middle-income countries[14] concluded that pharmacists may reduce healthcare use — including GP visit rates and hospitalisation — as well as medication-related costs, but noted the low quality of the evidence. A number of studies of pharmacists in primary care have reported cost-effectiveness via an improvement in clinical outcomes, such as cardiovascular risk,[52] and a reduction in drug-related errors.[8]

Findings of included studies were conflicting in terms of the impact on the number of medications per patient and overall medication costs: some showed an increase in medication use following pharmacist intervention. A previous systematic review of non-patient-facing pharmacist interventions in primary care suggested that pharmacists could improve the appropriateness of prescribing;[53] it may be that increases in prescribed medications result from pharmacists starting treatments appropriately, and that the observed reduction in medication-related costs is effected by switching to generic or more cost-effective medications.

The degree of integration of pharmacists into primary care teams may have a marked impact on their effectiveness: a recent systematic review[13] found that a higher degree of pharmacist integration was associated with improved health outcomes. It is possible that greater integration also has an impact on health system outcomes, along with the type of pharmacist intervention (medication review, treatment management, or patient education), and the pharmacist's skill-set (including their ability to prescribe independently); however, data were not available to allow for assessment of this.

Implications for research and practice

The potential for pharmacists to reduce the number of GP appointments has important implications at a time of unprecedented demand on the GP workforce in many countries.[2] Limitations regarding the quality of the included studies and the heterogeneous nature of the pharmacist interventions that were reported make it difficult to draw firm conclusions about the impact on GP workload; however, substituting consultations with pharmacists for more-costly GP appointments is likely to have a cost advantage.

The increased overall primary healthcare use found in some studies included in this review may suggest an increased ability of patients to access primary care through pharmacist integration. However, with much of this increase relating to protocol-driven follow-up, the impact on the pressure for primary care appointments outside of study settings is unclear. Furthermore, no study reported actual or perceived GP workload pressure. It is possible that the training, support, and supervision of pharmacists in primary care might represent an additional burden for GPs.

A recent focus on initiatives to reduce pressure on EDs has shown a clear association between accessible primary care services and a reduction in ED attendance.[54] It is possible that the apparent impact of pharmacists in primary care on ED use relates to improved access to primary care; irrespective of mechanism, any shift in usage from costly emergency services is of significant benefit to wider healthcare systems.

The integration of pharmacists into primary care must overcome a variety of barriers, including professional and patient resistance,[55–57] as well as more practical issues, such as accommodating additional professionals in crowded facilities;[56] a recent realist review[57] highlighted the need for flexibility in terms of approach to suit individual practice needs. However, the successful piloting of a programme to integrate pharmacists into primary care practices in England has resulted in expansion, with ongoing funding for pharmacists in this setting nationwide.[58] This provides an opportunity for further research, as wider implementation is likely to be necessary to give clear evidence of the impact of pharmacists' integration into primary care on health utilisation and costs. In the context of current workload challenges in primary care, as well as ongoing pressures on unscheduled care, it is particularly important that the impact of pharmacist integration on GP workload and ED use is clarified to inform future policy.

In conclusion, limited evidence suggests that pharmacists in primary care may save GPs time through a reduction in scheduled GP appointments and time spent on medication-related administration, while improving patient access to primary care. The possibility that pharmacists may also reduce ED use and overall healthcare costs suggests that initiatives for pharmacists' integration into primary care are likely to be cost effective. Further research is needed to establish the true impact of the integration of pharmacists in primary care at scale on healthcare systems in the longer term.

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Ethical approval

Ethical approval was not required in the writing of this article.

Provenance

Freely submitted; externally peer reviewed.

Competing interests

Benedict Hayhoe and Azeem Majeed are both GPs working in the NHS. The other authors declared no competing interests.

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