McMaster University | Health Forum

Rapid Evidence Synthesis Appendices

Impacts of pharmacist prescribing on equity-centred quadruple-aim outcomes

24 July 2025

[MHF product code: RES 131]

Appendices

1) Methodological details (Appendix 1)
2) Framework to organize what we looked for (Appendix 2)
3) Key findings from the included evidence documents (Appendix 3)
4) Key findings from highly relevant jurisdictional experiences (Appendix 4)
5) Detailed data extractions from the included evidence syntheses (Appendix 5)
6) Detailed data extractions from the included single studies (Appendix 6)
7) Documents excluded at the final stage of reviewing (Appendix 7)
8) References

Appendix 1: Methodological details

Background to the rapid evidence synthesis

This rapid evidence synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, the rapid evidence synthesis summarizes evidence drawn from existing evidence syntheses and from single research studies in areas not covered by existing evidence syntheses and/or if existing evidence syntheses are old or the science is moving fast. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select, and appraise research studies, and to synthesize data from the included studies. The rapid evidence synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

The Forum produces timely and demand-driven contextualized evidence syntheses such as this one that address pressing health and social system issues faced by decision-makers (see our website for more details and examples). This includes evidence syntheses produced within:

- days (e.g., rapid evidence profiles or living evidence profiles)
- weeks (e.g., rapid syntheses that at a minimum include a policy analysis of the best-available evidence which can be requested in a 10-, 30-, 60-, or 90-business-day timeframe)
- months (e.g., full evidence syntheses or living evidence syntheses with updates and enhancements over time).

This rapid evidence synthesis was prepared over a 30-day timeframe using the following steps:

1) submission of a question from a policymaker or stakeholder (in this case, the Ministry of Health in British Columbia, Canada)
2) engaging citizen partners
3) identifying, selecting, appraising, and synthesizing relevant research evidence about the question
4) conducting and synthesizing a jurisdictional scan of experiences about the question from other countries and Canadian provinces and territories
5) drafting the rapid evidence synthesis in such a way as to present concisely and in accessible language the research evidence
6) finalizing the rapid evidence synthesis based on the input of at least two merit reviewers.

Engaging citizen partners

At the beginning of each rapid evidence synthesis and throughout its development, we engage one or more citizen partners, who help us to scope the question and ensure relevant context is taken into account in the summary of the evidence.

Identification, selection, quality appraisal and synthesis of evidence

For this rapid evidence synthesis, we searched Health Systems Evidence, PubMed, and HealthEvidence.org for:
1) evidence syntheses
2) protocols for evidence syntheses that are underway
3) single studies.

In Health Systems Evidence, we searched for evidence syntheses using the key words "prescribing", "medication management", "medicine optimisation", "medication review", and "medicine optimization", all of which were combined using the "OR" Boolean operator. The "Pharmacists" search filter was applied, and results were restricted to those published between 2014 and 2025. In PubMed, we first searched for evidence syntheses, protocols, and single studies using the key words "pharmacist prescribing" and "pharmacist deprescribing", both of which were combined using the "OR" Boolean operator. We applied the search filters "Outcomes assessment" and "Broad, sensitive search" under Health Services Research PubMed Queries. Results were restricted to those published in the ten years preceding July 2025. The second PubMed search included the keywords "pharmacists", "prescribing", "deprescribing", and "prescription", alongside the 10-year publication limit and the "Systematic Review" filter. In HealthEvidence.org, we searched for evidence syntheses using key words related to pharmacists and (de)prescribing. Results were restricted by setting, namely those focused on the community and/or healthcare settings (i.e., clinic, community health centre, dentist, health department, hospital, long-term care, mobile health vehicle, primary healthcare provider office, rural or remote residential centre).

Each document retrieved through these searches was screened initially by one team member, with a second team member reviewing all screening decisions. Titles, abstracts, and full texts were reviewed at this stage. Any disagreements were resolved with the input of a third reviewer on the team.

For each evidence synthesis we included, we documented the dimension of the organizing framework (see Appendix 2) with which it aligns, key findings, living status, methodological quality (using AMSTAR), last year the literature was searched (as an indicator of how recently it was conducted), availability of GRADE profile, and equity considerations using an adapted version of PROGRESS+.

Two reviewers independently appraise the methodological quality of evidence syntheses that are deemed to be highly relevant using the first version of the AMSTAR tool. Two reviewers independently appraise each synthesis, and disagreements are resolved by consensus with a third reviewer if needed. AMSTAR rates overall methodological quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. High-quality evidence syntheses are those with scores of eight or higher out of a possible 11, medium-quality evidence syntheses are those with scores between four and seven, and low-quality evidence syntheses are those with scores less than four. It is important to note that the AMSTAR tool was developed to assess evidence syntheses focused on clinical interventions, so not all criteria apply to those pertaining to health-system arrangements or implementation strategies. Furthermore, we apply the AMSTAR criteria to evidence syntheses addressing all types of questions, not just those addressing questions about effectiveness, and some of these evidence syntheses addressing other types of questions are syntheses of qualitative studies. While AMSTAR does not account for some of the key attributes of syntheses of qualitative studies, such as whether and how citizens and subject-matter experts were involved, researchers' competency, and how reflexivity was approached, it remains the best general quality-assessment tool of which we're aware. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, an evidence synthesis that scores

8/8 is generally of comparable quality to another scoring 11/11; both ratings are considered 'high scores.' A high score signals that readers of the evidence synthesis can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the evidence synthesis should be discarded, merely that less confidence can be placed in its findings and that it needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1): S8.)

For primary research (if included), we documented the dimension of the organizing framework with which it aligns, publication date, jurisdiction studied, methods used, a description of the sample and intervention, declarative title and key findings, and equity considerations using an adapted version of PROGRESS+. We then used this extracted information to develop a synthesis of the key findings from the included syntheses and primary studies.

We do not exclude documents based on the language of a document. However, we are not able to extract key findings from documents that are written in languages other than Chinese, English, French, Portuguese, or Spanish. We provide any documents that do not have content available in these languages in an appendix containing documents excluded at the final stages of reviewing. We excluded documents that did not directly address the research questions and the relevant organizing framework. All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid evidence synthesis.

Identifying experiences from other countries and from Canadian provinces and territories

For each rapid evidence synthesis, we work with the requestors to collectively decide on what countries (and/or states or provinces) to examine based on the question posed. For jurisdictions outside Canada, we search relevant government and stakeholder websites, including national and regional health ministries (e.g., National Health Service in the United Kingdom), pharmacy regulators (e.g., General Pharmaceutical Council in the United Kingdom, Pharmacy Council of New Zealand), and professional pharmacy associations (e.g., Pharmaceutical Society of Australia, American Pharmacists Association). In Canada, a similar approach was used, which involved searching the websites of provincial and territorial pharmacy regulatory authorities (e.g., Alberta College of Pharmacy, College of Pharmacists of Manitoba), provincial pharmacy associations (e.g., New Brunswick Pharmacists' Association, Pharmacy Association of Nova Scotia), and government health departments. While we do not exclude content based on language, where information is not available in English, Chinese, French, Portuguese, or Spanish, we attempt to use site-specific translation functions or Google Translate. A full list of websites and organizations searched is available upon request.

Appendix 2: Framework to organize what we looked for

We used the framework below to categorize each of the evidence documents included in the rapid evidence synthesis and to structure the presentation of findings in the rapid evidence synthesis and appendices 5 and 6.

- Services
  - Prescribing
  - Adapting a prescription
  - Deprescribing
- Service model
  - Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  - Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan)
  - Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
  - Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
- Conditions
  - Chronic disease prescribing
    - Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease)
    - Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
    - Neurological disorders (e.g., Alzheimer's and other dementias, epilepsy, multiple sclerosis, Parkinson's disease)
    - Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders)
    - Musculoskeletal disorders (e.g., gout, osteoarthritis, osteoporosis, rheumatoid arthritis, juvenile idiopathic arthritis)
    - Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
  - Minor ailments (i.e., beyond the 21 for which B.C. pharmacists can currently prescribe)
    - Bacterial skin infections
    - Callouses and corns
    - Dehydration related to diarrhea or vomiting
    - Diarrhea (non-infectious)
    - Earache and ear infections
    - Erectile dysfunction
    - Fever
    - Folliculitis
    - Head lice
    - Motion sickness (travellers)
    - Nausea and vomiting (including preventive medications)
    - Premenstrual syndrome
    - Prenatal vitamins
    - Psoriasis
    - Scabies
    - Sleep disorders (minor)
    - Tick bites (prophylaxis for Lyme disease prevention)
    - Upper respiratory conditions (i.e., cough, cold, sore throat, nasal congestion, sinusitis)
    - Vomiting and nausea in pregnancy

        - Vasomotor rhinitis
        - Warts (excluding facial and genital)
        - Xerophthalmia (dry eyes)
    - Public health
        - COVID-19
        - Influenza
        - Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP)
        - Pharyngitis, including strep throat
        - Pneumonia
    - Opioid agonist treatment
        - Methadone
        - Combined buprenorphine and naloxone (Suboxone)
        - Slow-releasing oral morphine
        - Extended-release buprenorphine injection (Sublocade)
    - Any other conditions not listed above
- Settings
    - Community-based pharmacies
    - Primary care offices and networks
    - Hospitals and specialty care settings
    - Long-term and residential care homes
    - Rural and remote healthcare facilities
- Populations
    - People with co-morbidities
- People with a history of substance use
    - People living in rural and remote communities
- Equity-centred quadruple-aim outcomes
    - Population health outcomes
    - Patient experience
    - Provider experiences
    - Costs

Appendix 3: Key findings from the included evidence documents on the impacts of pharmacist prescribing on the equity-centred quadruple-aim outcomes

	Impacts of pharmacist prescribing on health outcomes	Impacts of pharmacist prescribing on patient experience	Impacts of pharmacist prescribing on provider experiences	Impacts of pharmacist prescribing on health-system costs
General prescribing	• General prescribing by pharmacists contributed to improved clinical outcomes (e.g., reductions in HbA1c, blood pressure, and LDL cholesterol) among patients with chronic diseases such as diabetes, hypertension, and cardiovascular conditions (1-18) • Including pharmacist prescribing as part of chronic disease programs and care teams helped improve treatment results and made it easier for patients to manage their conditions and stick to their medications (e.g., by working together with other providers, making joint decisions, and checking in regularly) (2; 3; 5; 7-12; 14; 16-31) • Pharmacist prescribing helped start treatment earlier and made follow-up more consistent, which led to better use of medications and improved long-term health outcomes (4; 7; 8; 11; 14; 15; 18; 23-25; 32; 33)	• Patients benefited from faster and more convenient access to treatment when pharmacists were authorized to prescribe, especially for chronic conditions (4; 6; 14; 18; 21; 25; 32-36) • Pharmacist prescribing improved patient-centredness through enhanced adherence support, shared decision-making, and care tailored to individual needs (3; 7; 12; 14; 16-18; 20; 23-25; 29; 37) • Patient satisfaction was reported to be high where pharmacists prescribed within their scope and provided ongoing monitoring (2; 3; 6; 14; 17; 19; 21; 23; 25; 29; 33; 38)	• Pharmacists with prescribing authority reported increased confidence, autonomy, and job satisfaction, particularly when their role was recognized as integral to primary care teams (10; 20; 21; 24; 27; 31; 34; 35; 39; 40) • Professional fulfilment improved when pharmacists were equipped to prescribe within a supportive team-based model that enabled collaborative care (10; 16; 20; 21; 24; 26-28; 31; 34) • Training gaps and inconsistent uptake across jurisdictions were noted as barriers that affected provider preparedness and role clarity (21; 27; 35; 37; 38; 41-44)	• Several studies indicated that general pharmacist prescribing contributed to cost savings by reducing unnecessary physician visits, lowering hospital admissions, and preventing service duplication (1; 3-5; 11; 12; 19; 29; 31; 33; 34; 45; 46) • Pharmacist prescribing was reported to be cost-effective when implemented with appropriate infrastructure, such as shared electronic health records and streamlined communication systems (1; 3-5; 9; 12; 22; 24; 26; 27; 31; 33; 45) • Economic models demonstrated positive returns when pharmacist prescribing was aligned with chronic care and team-based delivery models (1; 4; 11; 16; 21; 22; 26; 31; 33; 45; 46)

	Impacts of pharmacist prescribing on health outcomes	Impacts of pharmacist prescribing on patient experience	Impacts of pharmacist prescribing on provider experiences	Impacts of pharmacist prescribing on health-system costs

Assessment and treatment of minor ailments	• Minor ailments prescribing programs were found to be safe and clinically appropriate, with low rates of treatment failure or adverse events, appropriate referrals when needed, and fewer prescribing errors, including in cases where pharmacists provided effective stroke prevention therapy without increased risk (2; 3; 9; 23; 47; 48)
	• Structured protocols, formularies, and assessment tools helped ensure treatment quality and consistency across pharmacies and conditions (2; 12; 13; 15; 16; 18; 19; 24; 45; 47)
	  ○ This included the use of explicit tools like Beers Criteria or STOPP/START tools, guideline-based algorithms for prescribing, and integrated clinical decision support systems within electronic health records
		• Patients consistently reported high satisfaction with minor ailments services, highlighting timely care, symptom relief, and clear explanations from pharmacists, as well as convenience, quick access, and feeling respected during longer consultations (3; 14; 17; 21; 23; 25; 33; 34; 38)
		• Access to care was improved, particularly for non-urgent conditions, as patients were able to receive assessment and treatment directly from pharmacists without needing to visit a physician (3; 6; 14; 21; 32-34; 36)
		  ○ Patients found it easy to see or make an appointment with a pharmacist prescriber due to convenient locations and hours
		• Trust and confidence in pharmacists' clinical roles increased when patients experienced thorough assessments and personalized advice, with many expressing strong trust in their ability to prescribe and provide care, and appreciating their professionalism, attention to
			• Pharmacists who prescribed for minor ailments reported feeling more confident and satisfied in their roles, especially when they had training, team support, and opportunities to build experience (e.g., better use of their skills, stronger sense of autonomy, greater engagement) (10; 20; 21; 24; 27; 31; 35; 38; 40)
			• These programs allowed pharmacists to work to their full scope in primary care and showed their value through medication management, follow-ups, and taking on tasks that eased the burden on physicians (i.e., reducing workload, improving efficiency, and supporting patient care) (3; 15; 16; 20; 21; 24; 27; 31; 33; 34; 40)
				• Minor ailments prescribing helped reduce pressure on more costly health services by shifting care for self-limiting conditions away from emergency departments and physicians, with pharmacist prescribing linked to lower healthcare utilization, reduced physician workload, cost savings, and fewer emergency visits or post-discharge encounters (3; 6; 29; 33)
				• Cost-effectiveness analyses suggested potential for system-level savings, although some evaluations were limited by short timeframes or contextual differences (1; 3; 4; 11; 12; 19; 31; 33; 45)
				• Pharmacist independent prescribing was consistently found to be cost-effective and often cost-saving for conditions like cardiovascular disease and venous thromboembolism, though some interventions increased costs (e.g., due to earlier treatment or higher drug use), and limitations such as short time horizons and a focus on medication costs without considering labour or workflow reduced the ability to fully capture long-term economic impact (1; 3; 4; 11; 12; 20; 31; 33; 45)
				• Challenges to financial sustainability included inconsistent remuneration and coverage across jurisdictions, limited insurance support, and patients paying out of pocket for unfunded services (e.g., direct consultation fees), with pharmacists highlighting that time demands, lack of public

	Impacts of pharmacist prescribing on health outcomes	Impacts of pharmacist prescribing on patient experience	Impacts of pharmacist prescribing on provider experiences	Impacts of pharmacist prescribing on health-system costs
		detail, and ability to build rapport (14; 17; 21; 25; 33)		awareness, and a preference for stable over pay-for-performance funding models all affected the long-term viability of prescribing services (24; 35; 36; 38; 39)
Chronic disease prescribing	• Pharmacist prescribing for chronic conditions such as diabetes, hypertension, cardiovascular disease, and asthma led to improvements in clinical outcomes, including lower HbA1c, blood pressure, and LDL cholesterol levels (1-18; 23) • Integrating pharmacists into team-based chronic disease management allowed for timely medication changes, regular medication reviews, stopping inappropriate drugs, and improving treatment plans for chronic conditions, which led to better disease control and less polypharmacy (5; 7-10; 12; 16; 18; 20; 24; 26; 27; 29-31; 46) o Collaborative care models and formal agreements helped pharmacists play a stronger role in following treatment guidelines by supporting shared decisions and helping them navigate challenges like unfamiliar	• Patients receiving pharmacist-led prescribing for chronic disease reported high satisfaction, pointing to personalized care, clear explanations, and greater support in managing their condition, with many appreciating the convenience, extended consultation times, and the professionalism and attention to detail that helped them better understand their health and feel more confident in taking their medications (2; 14; 17; 19-21; 23; 25; 29; 33) • Trust in pharmacists grew when patients experienced proactive follow-up, clear communication, and collaborative goal setting, with many expressing confidence in pharmacists' ability to prescribe and provide care, appreciating their supportive demeanour, ongoing engagement, and efforts to listen, answer questions, and involve them	• Pharmacists reported greater professional confidence and job satisfaction when involved in chronic disease prescribing, especially when supported by interprofessional teams and access to patient records, with collaborative roles enhancing skill use and engagement (e.g., improved use of skills and job satisfaction), experience building self-efficacy (e.g., increased confidence as more colleagues prescribed), and key enablers including competence, confidence, and team support (e.g., lack of access to medical records was noted as a barrier, highlighting its importance for effective prescribing) (10; 20; 21; 24; 27; 31; 35; 40) • Prescribing roles strengthened pharmacists' ability to work to their full scope and contribute meaningfully to care	• Pharmacist prescribing in chronic disease management showed strong potential for cost savings by improving control of long-term conditions and reducing reliance on acute care, with evidence of cost-effectiveness across areas such as cardiovascular disease, hypertension, and diabetes (e.g., pharmacist management of hypertension saved over CA $6,000 per person, early insulin initiation reduced diabetes-related complications, and hospital-based deprescribing lowered medication costs and supported earlier discharges) (1; 3-6; 11; 12; 19; 29; 31; 33; 45) • Economic benefits were greatest when pharmacist prescribing was embedded in structured, team-based models supported by clinical systems and collaborative policies, with independent prescribing shown to be cost-effective and cost-saving in doctor-pharmacist models (e.g., integration within clinics or hospitals, use of EMR decision-support tools, and collaborative agreements enabling medication adjustments and improved adherence to treatment guidelines) (1; 4; 8; 9; 12; 20; 24; 26-28; 31; 45; 46)

	Impacts of pharmacist prescribing on health outcomes	Impacts of pharmacist prescribing on patient experience	Impacts of pharmacist prescribing on provider experiences	Impacts of pharmacist prescribing on health-system costs
	medications and insurance issues, leading to better care and smoother service delivery • Pharmacist-led prescribing enabled earlier intervention and improved continuity of care, with pharmacists initiating treatments like insulin up to two years earlier than physicians for patients with uncontrolled diabetes, improving quality-adjusted life-years and reducing complications, while also ensuring safer discharge medications and strengthening their role in ongoing chronic disease management (4; 11; 12; 18; 24; 29) • Prescribing pharmacists supported treatment adherence and patient self-management by providing personalized consultations, shared decision-making, and motivational interviewing, while also conducting ongoing monitoring, medication reconciliation, and patient education to improve understanding, reduce discrepancies during care transitions, and promote consistent use of medications in chronic	in treatment decisions (14; 17; 19; 25; 33)	planning and management, with expanded roles in collaborative care supporting medication adjustments and follow-ups (e.g., medication reconciliation, counselling, and prescribing), improving system efficiency, and enhancing patient care (e.g., in oncology, additional prescribing authorization was especially beneficial for ambulatory assessment and follow-up) (3; 15; 16; 20; 21; 24; 27; 31; 33; 34; 40) • Successful implementation of pharmacist prescribing relied on supportive practice environments, adequate training, and access to shared clinical tools, with key facilitators including interprofessional team settings, electronic medical record (EMR) compatibility (e.g., system modifications for dosing and documentation), peer and management support, and sufficient resources to enable advanced scope, making prescribing widely beneficial when paired	• Implementation challenges included variations in scope, inconsistent integration with physicians, and gaps in remuneration and data access (e.g., limited insurance coverage, unfunded services, lack of access to medical records), along with concerns about liability, limited diagnostic authority, and systemic barriers (e.g., lack of privacy, insufficient training, absence of protocols or legislation) (21; 24; 35; 36; 38; 39; 44) ○ Additional challenges involved time and certification burdens for under-resourced services, resistance from families and physicians, limited public awareness of prescribing services, discomfort with pay-for-performance models (e.g., concerns about patient cooperation or misinterpreted intent), and a lack of evidence on the risks of deprescribing

	Impacts of pharmacist prescribing on health outcomes	Impacts of pharmacist prescribing on patient experience	Impacts of pharmacist prescribing on provider experiences	Impacts of pharmacist prescribing on health-system costs
	disease management (5; 8; 12; 16; 18; 20; 23; 24; 29; 30)		with collaborative structures and minor contextual adjustments (21; 24; 27; 31)	
Public health prescribing	• Pharmacist prescribing was associated with clinical improvements and fewer adverse effects, and achieved clinical outcomes comparable to those seen with other (e.g., pharmacist, nurse practitioner, or physician assistant) prescribers (3; 47) • For people experiencing homelessness, pharmacist prescribing improved medication adherence, facilitated access to other primary and secondary healthcare services, and improved well-being (14) • Pharmacist prescribing increased the likelihood of appropriate prescribing (e.g., through discontinuation of antibiotics for patients who no longer require them) (3; 47; 48)	• Patients reported high satisfaction with pharmacist prescribing services (3; 14; 25; 38) • Pharmacist prescribing improved patients' health knowledge, given the capacity of pharmacists to listen effectively, answer questions, and verify patient understanding (14; 25; 48) • Pharmacist prescribing generally enhanced the accessibility of medications by mitigating logistical and other barriers (e.g., limited hours of operation, inaccessible locations, stigma in traditional prescribing settings, confidentiality concerns); however, prescribing pharmacists were found to be unevenly distributed across communities, potentially reinforcing inequities in medications access (3; 14; 32; 49; 50) • For effective pharmacist prescribing, sufficient resourcing for pharmacist education, staffing, collaboration with	• Pharmacists generally viewed prescribing as part of their roles and perceived it positively (35; 42; 51) • However, multilevel factors hindered the uptake of prescribing practice among pharmacists, including those who have intentions to prescribe; identified barriers included inadequate staff, training, physical infrastructure, public knowledge around service availability, and patient unwillingness to wait for pharmacists to become available, alongside high administrative burden, pressure from employers to prioritize quantity over quality, and the potential for pharmacist prescribing to harm pharmacist–physician relationships (35; 42; 51)	• Pharmacist prescribing was associated with decreased healthcare utilization and, in the case of strep throat treatment, seems cost-effective relative to the standard of care (3)

	Impacts of pharmacist prescribing on health outcomes	Impacts of pharmacist prescribing on patient experience	Impacts of pharmacist prescribing on provider experiences	Impacts of pharmacist prescribing on health-system costs
		physicians, supportive legislation, and patient awareness of services were reported as required (38; 50)		
Prescription of opioid agonist treatment	• Pharmacist prescribing appeared to increase patient retention on opioid agonist treatment (buprenorphine) (52)	• Pharmacist prescribing seemed to have enhanced the accessibility of opioid agonist treatment by mitigating logistical barriers (e.g., limited hours of operation, inaccessible locations); however, prescribing pharmacists were found to be unevenly distributed across communities, potentially reinforcing inequities in opioid agonist treatment access (32; 52)	N/A	N/A

Appendix 4: Key findings from highly relevant jurisdictional experiences on the impacts of pharmacist prescribing on the equity-centred quadruple-aim outcomes

Features of pharmacist scope of practice	Canadian provinces and territories		International jurisdictions
	B.C.	All other provinces and territories	
Assessment and treatment of minor ailments			
Acne (mild)	Yes	(10/12) AB, SK, MB, ON, QC, NB, NS, PE, NL YT (mild to moderate acne)	(2/4) AU, US (Idaho)
Allergies and hay fever	Yes	(9/12) AB, SK, MB, ON, QC, NS, PE, NL, YT	(1/4) US (Idaho)
Bacterial skin infections	No	(1/12) SK	(1/4) NZ (minor skin infections)
Callouses and corns	No	(1/12) NL	(0/4)
Canker sores (oral ulcers)	Yes	(9/12) AB, SK, MB, ON, QC, NS, PE, NL, YT	(0/4)
Cradle cap	Yes	(1/12) AB	(0/4)
Cold sores	Yes	(9/12) AB, SK, ON, QC, NB, NS, PE, NL, YT	(1/4) US (Idaho)
Cough and cold (and other upper respiratory conditions: sore throat, congestion)	No	(2/12) PE (sore throat), NL	(2/4) US (Oregon – cough and cold), UK (earache, sore throat, sinusitis)
Dandruff	Yes	(4/12) AB, NS, PE, NL	(0/4)
Diarrhea (non-infectious)	No	(3/12) NS, PE, NL	(1/4) NZ (acute dehydration related to diarrhea or vomiting)
Dry eyes	No	(3/12) NS, PE, NL (xerophthalmia)	(0/4)
Ear infections (acute otitis media)	No	(1/12) SK	3/4 (AU, US, UK)
Erectile dysfunction	No	(1/12) SK	(1/4) NZ
Fever	No	(0/12)	(1/4) NZ
Folliculitis	No	(1/12) SK	(0/4)
Fungal infections	Yes	(6/12) AB, SK (athlete's foot, ringworm), MB, QC, PE (fungal skin infections), NL	(1/4) US (fungal skin infections within select states with collaborative practice agreements)
Headaches	Yes	(5/12) AB, SK, NS, PE, NL	(0/4)
Heartburn (acid reflux/GERD)	Yes	(9/12) AB, SK, ON, QC, NB, NS, PE, NL, YT	(1/4) AU
Hemorrhoids	Yes	(9/12) AB, SK, MB, ON, NS, PE, NL, YT	(0/4)
Hives and itching, including from bug bites (urticaria)	Yes	(8/12) AB, SK, MB, ON, NS, PE, NL, YT	(1/4) UK (infected insect bites for patients aged 1+ years)
Impetigo	Yes	(8/12) AB, SK, ON, NB, NS, PE, NL, YT	(2/4) AU, UK (patients aged 1+ years)
Menstrual pain (dysmenorrhea)	Yes	(8/12) AB, SK, ON, QC, NS, PE, NL, YT	(0/4)

Features of pharmacist scope of practice	Canadian provinces and territories		International jurisdictions
	B.C.	All other provinces and territories	
Nasal congestion	No	(1/12) PE	(0/4)
Nausea	No	(5/12) ON, QC, NS, PE, NL	(1/4) AU
Nicotine dependence	Yes	(8/12) AB, SK, MB, ON, QC, PE, NL, YT	(2/4) NZ, US (in 17 states, including California, New Mexico, Oregon)
Pediculosis (head lice)	No	(1/12) QC	(2/4) NZ, US (Idaho)
Pink eye (conjunctivitis)	Yes	(7/12) AB, SK, ON, QC, NB, NS, YT	(1/4) NZ
Pinworms or threadworms	Yes	(7/12) AB, SK (pinworms), ON, NS, PE, NL, YT	(0/4)
Premenstrual syndrome	No	(1/12) AB	(0/4)
Psoriasis	No	(2/12) AB, MB	(1/4) AU
Scabies	No	(0/12)	(1/4) NZ
Shingles	Yes	(7/12) AB, SK, QC, NB, NS, PE, YT	(1/4) UK
Skin rash (dermatitis)	Yes	(10/12) AB, SK (contact dermatitis and diaper rash), MB (including seborrhoeic dermatitis), ON (including diaper, atopic, eczema, allergic and contact dermatitis), NB, PE, NL (mild to moderate atopic dermatitis and contact dermatitis), YT (diaper dermatitis and eczema)	(2/4) AU, NZ
Minor sleep disorders	No	(3/12) NS, PE, NL	(0/4)
Sprains and strains (musculoskeletal pain)	Yes	(6/12) AB (muscle pain and stiff muscles), SK, ON, PE (minor joint pain), NS, YT	(2/4) AU, NZ
Thrush (oral fungal infection)	Yes	(9/12) AB, SK, MB, ON, QC (including clear oral thrush from the use of corticosteroid inhalers), NS, PE, NL, YT	(0/4)
Tick bites (Lyme disease prophylaxis)	No	(5/12) SK, ON, QC, NB, NS	(1/4) US (Idaho)
Upset stomach (indigestion)	Yes	(3/12) AB, PE, NL (dyspepsia)	(0/4)
Urinary tract infection (uncomplicated)	Yes	(9/12) AB, SK, MB, ON, QC (recent urinary tract infections), NB, NS, PE, YT	(2/4) NZ, UK
Vomiting in pregnancy	No	(1/12) MB	(0/4)
Vasomotor Rhinitis	No	(1/12) MB	(1/4) AU
Warts (excluding facial/genital)	No	(3/12) NS, PE, NL	(0/4)
Yeast infection (vaginal candidiasis)	Yes	(8/12) AB, MB, ON, QC, NS, PE, NL, YT	(1/4) US (Oregon)
Contraception			

Features of pharmacist scope of practice	Canadian provinces and territories		International jurisdictions
	B.C.	All other provinces and territories	
Emergency contraception	Yes	(12/12) AB, SK, MB, ON, QC, NB, NS, PE, NL, NWT, YK, NU	(3/4) AU, NZ, US (states with general collaborative practice agreements, prescriptive authority for pharmacists, statewide protocols, or standing orders)
Hormonal contraception (oral contraception, contraceptive implant, injectable contraceptive, vaginal ring, transdermal contraceptive, implant)	Yes	(3/12) SK, QC, PE	(3/4) NZ, UK, US (states with general collaborative practice agreements, prescriptive authority, statewide protocols, or standing orders)
Non-hormonal contraception (copper IUD)	Yes	(0/12)	(0/4)
Schedule I Drug prescribing (i.e., chronic disease prescribing)			
Limited supply (including of a new medication) can be prescribed during emergencies, particularly if there is an urgent risk to patient health, until they can see a primary care provider or specialist	No	(2/12) NS, PE	(0/4)
Can discontinue a medication if it seems to be non-beneficial or even harmful, or if the patient is not taking the medication	No	(1/12) NS	(1/4) AU (with protocol/structured prescribing)
Public health prescribing (e.g., STIs and strep throat, HIV PrEP, COVID-19, hepatitis C)			
Chlamydia treatment	No	(1/12) AB	(0/4)
Gonorrhea treatment	No	(1/12) AB	(0/4)
Herpes simplex (genital herpes) treatment	No	(2/12) AB, SK	(0/4)
HIV (pre-exposure prophylaxis)	No	(1/12) AB	(0/4)
Prescribing for COVID-19-related cough	No	(1/12) NS	(0/4)
Oseltamivir (Tamiflu) for influenza treatment and nirmatrelvir/ritonavir (Paxlovid) for COVID-19 treatment	No	(1/12) ON	(0/4)
Paxlovid for the treatment of COVID-19	No	(3/12) SK, ON, PE	(1/4) US
COVID-19 treatment for patients who test positive for COVID-19	No	(1/12) QC	(0/4)
Diarrhea treatment for travellers	No	(1/12) QC	(1/4) AU

Features of pharmacist scope of practice	Canadian provinces and territories		International jurisdictions
	B.C.	All other provinces and territories	
HIV post-accidental exposure prophylaxis	No	(1/12) QC	(0/4)
Influenza treatment for those at risk of influenza	No	(1/12) QC	(0/4)
Prevention of malaria and altitude sickness among travellers	No	(1/12) QC	(0/4)
Strep Throat	No	(1/12) SK	(0/4)
Medications to prevent altitude sickness, encephalitis, hepatitis A and B, malaria, rabies, diarrhea, typhoid, and yellow fever among travellers	No	(1/12) YT	(0/4)
Prescription of opioid agonist treatment			
Buprenorphine	No	(1/12) NB	(0/4)
Methadone	No	(1/12) NB	(0/4)
Slow-release oral morphine (SROM)	No	(1/12) NB	(0/4)
Other			
Offering of folic acid and vitamin supplements pre- and during pregnancy	No	(1/12) QC	(0/4)
Offering of prophylaxis for valve patients	No	(1/12) QC	(0/4)

Appendix 5: Detailed data extractions from evidence syntheses about the impacts of pharmacist prescribing on the equity-centred quadruple-aim outcomes

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

• Services
  ○ Deprescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Any other conditions not listed above
• Settings
  ○ Hospitals and specialty care settings
  ○ Long-term and residential care homes
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
  ○ Patient experience
	Pharmacist-led deprescribing reduced frailty (e.g., improved frailty scores and fewer inappropriate medications), was well accepted by patients (i.e., most felt comfortable stopping medications), and led to cost savings (19)
	• The study evaluated the safety, feasibility, and clinical impact of deprescribing interventions in older adults aged 65 and above living with frailty
	• Out of 2,322 articles identified, six studies (including two randomized controlled trials) with a total of 657 participants (mean age range 79–87 years) were included
	• Studies were conducted in various settings including hospitals, outpatient clinics, and residential aged care
	• Frailty was measured using validated scales such as the Frailty Index or Clinical Frailty Scale, ensuring participants represented a vulnerable population
	• Types of Deprescribing Interventions:
	  ○ Three studies involved pharmacist-led interventions focused on medication reviews and recommendations for stopping or adjusting drugs, meaning pharmacists were the primary professionals delivering the intervention
	  ○ Three studies involved multidisciplinary teams (including physicians, pharmacists, and nurses) collaboratively implementing deprescribing protocols
	  ○ Tools used to guide deprescribing were both explicit (e.g., Beers Criteria, STOPP/START tools) and implicit (clinical judgment-based), sometimes in combination
	• Pharmacists primarily exercised a recommending and collaborative authority in deprescribing interventions, as their suggestions for medication changes consistently required acceptance and implementation by the patient's general practitioner (GP) or the admitting physician
	• The most common medication classes targeted for deprescribing included benzodiazepines, antidepressants,
		No	6/10	2020	No	• Age

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

	neuroleptics (antipsychotics), opiates, lipid-lowering agents (statins), proton pump inhibitors (PPIs), cardiovascular drugs (e.g., aspirin, antiplatelets, b-blockers, digoxin), and vitamin and nutritional supplements
	• Feasibility was high: 72–91% of pharmacist recommendations were implemented, and only about 25% of patients later restarted the medications
	• Across the included studies, deprescribing was generally safe and well tolerated by older adults with frailty
	  ○ No significant increases in adverse drug reactions, hospital admissions, or mortality were reported following deprescribing interventions, this supports the notion that carefully planned deprescribing does not compromise patient safety
	• Deprescribing was associated with some positive clinical effects:
	  ○ Improvements in mental health and depressive symptoms were observed in some studies
	  ○ Functional status and measures of frailty showed beneficial trends, although evidence was mixed and not always statistically significant
	  ○ Effects on falls and cognitive function were inconsistent, highlighting the need for further research in these areas
	  ○ Quality of life measures generally showed no significant change, possibly due to short follow-up periods or measurement limitations
	  ○ All studies consistently reported a reduction in the number of medications prescribed and a decrease in potentially inappropriate medications (PIMs)
	  ○ This reduction in polypharmacy is particularly important in frail older adults, who are at increased risk of medication-related harm due to altered pharmacodynamics and pharmacokinetics					

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have
	Independent prescribing by pharmacists has shown significant improvements in health and clinical outcomes, and demonstrated cost-effectiveness for conditions such as cardiovascular disease (CVD) and venous thromboembolism (1)	No	6/9	2022	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
• Settings
  ○ Community-based pharmacies
  ○ Primary care offices and networks
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Costs
	• This scoping review aimed to identify, synthesize, and report evidence on the costs, consequences, and value for money of non-medical prescribing (NMP) by non-medical healthcare professionals, including pharmacists
	  ○ In this review, non-medical prescribing refers to the legal prescribing rights granted to pharmacists, nurses, and other non-medical healthcare professionals who have completed an approved education or training program
	  ▪ This includes independent prescribing, where the prescriber makes treatment decisions within their scope of practice, and supplementary prescribing, where, following the independent prescriber's assessment and diagnosis, a patient-specific clinical management plan is agreed upon by the independent prescriber, the supplementary prescriber, and the patient
	• Most cost-effectiveness evidence relates to pharmacists
	• Three studies conducted cost-effectiveness analyses to evaluate and demonstrate the value for money of pharmacist independent prescribing, consistently showing it to be both cost-effective and cost-saving for patients with CVD and venous thromboembolism
	  ○ Independent prescribing by pharmacists was assessed across various health conditions (e.g., venous thromboembolism, hypertension), with significant improvements in health and clinical outcomes reported
	• In one Canadian study, the 30-year CVD risk in the pharmacist prescriber group decreased from 0.61 at baseline to 0.41, indicating two fewer CVD events per 10 individuals receiving the intervention
	• Although the intervention incurred additional costs of CA$7,145 (due to the intervention and medications), these were offset by CA$15,094 in savings from reduced CVD and comorbidity costs, suggesting that pharmacist independent prescribing was both less costly and more effective than usual care
	  ○ Only one study conducted in the United Kingdom found that, compared to usual care, pharmacist prescribing for					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
	chronic pain was more costly (77.5 pounds for the prescribing arm and 54.4 pounds for the review arm) and provided similar QALYs; however, the authors recommended a larger sample size to produce more reliable data					

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
  ▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders)
• Settings
  ○ Community-based pharmacies
• Populations
  ○ People with a history of substance use
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
	Pharmacist-led interventions to improve medication adherence in patients with mental health disorders were associated with improved adherence rates, enhanced patient engagement, and reduced hospitalization (20)
	• The review exclusively targeted pharmacist interventions in improving medication adherence among patients with mental health conditions, including depression, schizophrenia, and comorbid substance use disorders
	• Many pharmacists operated in collaborative care models, working within mental health clinics or hospitals alongside other healthcare professionals to support adherence and improve treatment outcomes
	  ○ The pharmacists conducted medication reviews, recommended therapy changes, and in some cases, had prescribing authority under defined protocols or within their scope of practice
	• Some studies highlighted pharmacist prescribing capabilities, particularly in the U.S., where pharmacists with specialized psychiatric credentials (e.g., BCPP) contributed to medication adjustments and follow-ups
	• Geographic disparities, such as the projected shortage of psychiatrists in rural areas, and advocates for embedding pharmacists into care models to enhance equity in mental healthcare access were noted
	• Interventions like shared decision-making, motivational interviewing, and personalized consultations enhanced patient satisfaction, while pharmacists reported increased engagement and professional fulfilment in collaborative roles
		No	4/9	2022	No	• Place of residence

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
• Patient experience ○ Provider experiences						

• Services
  ○ Prescribing
• Service model
  ○ Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
  ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart
	This effectiveness and safety systematic review found low-to-moderate evidence that pharmacist prescribing is at least as safe as physician prescribing in the hospital setting, with pharmacists having better adherence to dosing guidelines and fewer prescribing errors (2)
	• The included studies spanned several jurisdictions and prescription types (U.S., Australia, U.K., Canada, and Hong Kong; anticoagulants, antihypertensive medications, antidiabetic medications, and medications for hypercholesterolemia)
	  ○ For all of these medications, the authors of the systematic review felt there was enough evidence to support the recommendation that these medications be prescribed by pharmacists within hospital settings where dependent (supplementary and protocol-driven) and collaborative service models, as well as dosing nomograms, are supportive of this non-medical prescribing
	  ▪ The hospital setting was defined as inpatient hospital care, outpatient clinics, and preoperative/preadmission clinics
	• Pharmacist experience level varied in the included studies (general clinical pharmacists, specialized clinical pharmacists, and pharmacists with postgraduate residency training)
	• Pharmacist and physician prescribing had similar therapeutic benefits, adverse effects, morbidity, mortality, and patient satisfaction
	  ○ While patient satisfaction was comparable, patients noted an appreciation for pharmacist prescribing because it felt more accessible and they believed that pharmacists spent more time with them; however, patients also indicated more confidence in or a preference for physicians to make the initial diagnosis and for the involvement of a multidisciplinary team for complex conditions
	• When patients were admitted to the hospital, pharmacists more accurately prescribed the patient's usual medication
		No	7/10	2017	No	• Race/ethnicity
						• Sex
						• Age

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) • Settings o Hospitals and specialty care settings • Equity-centred quadruple-aim outcomes o Population health outcomes o Patient experience	regimen compared to physicians and better adhered to nomograms for accurate dosage conversions • If physician audits were required for pharmacist prescribing, the pharmacists' plans were accepted 99% of the time without modification o Pharmacists made far fewer prescribing errors (both in general and for errors that were classified as moderate, high, or catastrophic risk) and were less likely to make multiple errors for one patient compared to physicians ▪ Prescribing errors can lead to adverse events and therefore have clinical significance (unlike documentation errors), including medication, dose, frequency, or route of administration errors ▪ Moderate, high, and catastrophic risk errors result in population health and health system cost effects (including increased length of stay or readmission, morbidity, or death) • Nearly half of the errors/omissions by doctors had the potential cause harm to the patient, whereas almost none of the pharmacist prescribing errors had that same risk o 1% of errors were moderate risk from pharmacists, compared to 17.1% from doctors; 0.2% and 31.7%, respectively, for high-risk errors; and 0% and 5.3%, respectively, that put patients at extreme risk • The authors of the review posited that the high error rate for doctors may be due to the profession's high workload demands, potentially explaining why such stark differences in error rates were observed between physician and pharmacist prescribing • Three service models were found in the literature, but in all studies pharmacists could prescribe autonomously based on established guidelines or dosing nomograms, clinical judgment, or following consultation with a doctor o Collaborative prescribing was found to be well suited for the outpatient setting when pharmacists were highly specialized, however few studies existed for this model of prescribing o No studies were found on independent prescribing					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
	• Supplementary and protocol-driven models were both classified under the review's category of 'dependent prescribing,' where protocol-driven was most common in the literature since it generally did not require changes to the current scope of practice for pharmacists and thus may be more acceptable to doctors and easily implementable ○ Supplementary prescribing was found to be more common in the elective surgery, ambulatory, and inpatient settings, especially in Australia where pharmacist prescribing was not legalized and thus formal (and limited) agreements between pharmacists and doctors were needed • A framework for non-medical prescribing was proposed that outlines implementation considerations for safe and competent prescribing, including required (and maintained) accreditation and training and legislation and regulations that authorize pharmacists to prescribe					

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor
	Pharmacist-led prescribing led to positive experiences among providers and patients, such as increased access to health services, job satisfaction, and reduced physician workload (21)
	• The review summarized stakeholders' views and experiences of pharmacist prescribing mostly from the United Kingdom, Australia, Canada, and the U.S., where they provided details on the following jurisdictions:
	  ○ In the U.K., pharmacists are responsible and accountable for the assessment of patients and to make clinical management decisions including prescribing for any conditions within their clinical competence as independent prescribers, or can conduct supplementary prescribing (i.e., voluntary partnership with a doctor or dentist and a supplementary prescriber based on a clinical management plan)
	  ○ In the U.S., a collaborative practice agreement between physicians and pharmacists allows for professional responsibility for performing patient assessments, ordering drug therapy-related lab tests, administering drugs, and selecting, initiating, monitoring, continuing, and adjusting drug regimens
		No	6/10	2017	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe)
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
  ○ Patient experience
  ○ Provider experiences
	• Of the 65 included studies, 27 studies reported perspectives primarily from pharmacists, followed by patients, doctors, general public, nurses, policymakers, and other groups of stakeholders
	• The review provided limited descriptions on specific conditions or medications, but reported the following:
	  ○ Three U.K. based studies in the review described that pharmacists preferred supplementary prescribing or prescribing for minor and chronic conditions due to liability and diagnosis-related concerns
	  ○ One study based in Australia described that hospital pharmacists supported supplementary prescribing for heart failure and anticoagulant therapies, and independent prescribing for anticoagulant therapies
	  ○ One study based in Australia reported high levels of appropriate antibiotic prescribing for uncomplicated urinary tract infection, cellulitis, and acne
	• Majority of the studies (both pre- and post-implementation) reported positive experiences such as increased access to health services, perceptions of enhanced patient outcomes, improved use of skills and job satisfaction, and reduced physician workload
	• Concerns related to prescribing included: liability, limited pharmacist diagnostic skills, access to medical records, and limited resource support (including administration and financial support)
	• Facilitators included personal qualities of the pharmacist (e.g., communication, enthusiasm, experience), practice setting (e.g., working in an interprofessional team), and resource support (e.g., support from medical team and infrastructure)
	• Barriers included poor clinical skills, inaccessibility to medical records, doctors' opposition, poor recognition, and other types of logistics (e.g., referral process)					

• Services
  ○ Prescribing
  ○ Adapting a prescription
• Service model
	There are limited measures to directly assess the impact of pharmacist prescribing on access to medicines and accessibility of services; however, there is some indication that there was an increased proportion of eligible patients receiving medication, increased overall number of medicines dispensed, reduced time	No	6/10	2023	No	• Place of residence
						• Socio-economic status

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) ○ Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan) ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Chronic disease prescribing ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease) ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol	to receiving treatment, and improved accessibility to these services across the U.K., U.S., Canada, and New Zealand (32) • The review assessed the direct impacts of pharmacist prescribing on access to medicines and the accessibility of pharmacist prescribing services in primary care settings across the U.K., U.S., Canada, and New Zealand • The authors' definition of prescribing involved initiation (making a diagnosis and issuing a prescription), continuation (prescription renewal), and modification (amending dose, formulation, regimen, or route of prescribing) • Included prescribing models included independent, dependent (based on a protocol or formal agreement through standing orders and statewide protocols), and collaborative (agreement with roles and responsibilities delegated) • The settings included community pharmacies and mixed settings that included community pharmacies. • The review included studies that broadly described the following conditions by service level: ○ Independent: Cardiovascular risk reduction, substance use disorder, emergency contraception, naloxone, non-specified minor ailments ○ Dependent or supplementary (protocol-based): Hormonal contraception, urinary tract infection, nicotine replacement therapy, emergency contraception, other non-specified minor ailments, chronic obstructive pulmonary disease, impetigo, hypertension ○ Collaborative: Mental health conditions, opioid use disorder (buprenorphine), hormonal contraception, HIV pre-exposure prophylaxis, statins, dyslipidemia, Group A strep pharyngitis • Only a few studies measured the direct impacts of pharmacist prescribing on medicines access, but there was some indication that there was improved access by increasing the proportion of eligible patients receiving medication, overall number of medicines dispensed, and reducing the time to receiving treatment • The authors concluded that most of the studies made inferences related to the impact of pharmacist prescribing on					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders) o Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe) ▪ Bacterial skin infections o Public health ▪ Influenza ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) ▪ Pharyngitis, including strep throat o Opioid agonist treatment ▪ Combined buprenorphine and naloxone (Suboxone)	medicine access, which may cause an overstated association between them • Related to patient experiences, they reported that it was easy to see or make an appointment with a pharmacist prescriber, and found it beneficial to see them due to the store location and hours • Some of the studies reported differences in density and availability of prescribing pharmacists across areas with different socio-demographics (e.g., income level, proportion of insured residents, representation of marginalized populations), such as lower density of pharmacies that offered pharmacist prescribing in areas with higher proportions of marginalized populations • Overall, the authors concluded that measures of medicine access were varied and limited for direct measurement					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
▪ Extended-release buprenorphine injection (Sublocade) • Settings o Community-based pharmacies o Primary care offices and networks • Equity-centred quadruple-aim outcomes o Population health outcomes o Patient experience o Provider experiences						
• Service model o Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions o Chronic disease prescribing ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease) ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol	Pharmacist-independent prescribing models led to improved access to care, reduced physician workload, and provided cost savings to the reported health systems (33) • The review analyzed the contribution of independent prescribing by community pharmacists at the patient, organizational, and society levels in terms of efficacy, effectiveness, and efficiency • The review solely focused on pharmacist-independent prescribing models (i.e., no systematic agreements), which they described as services that do not necessarily involve new diagnoses, for minor ailments, prescribing adaptations, substitutions, renewal, or emergency prescriptions • Most of the 13 included studies were from Canada, followed by U.K., U.S., and Australia • Minor conditions (i.e., cold sores, insect bites, seasonal allergies, urinary tract infection, sore throat, asthma, insulin, upper respiratory tract infections, contact dermatitis, conjunctivitis) and some interventions involving cardiovascular disease (i.e., blood pressure control) were reported • Overall, the authors reported that pharmacist-independent prescribing led to improved access to care, reduced physician workload, and cost savings	No	5/9	2023	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) o Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe) ▪ Bacterial skin infections ▪ Upper respiratory conditions (i.e., cough, cold, sore throat, nasal congestion, sinusitis) • Settings o Community-based pharmacies • Equity-centred quadruple-aim outcomes o Population health outcomes • Patient experience o Provider experiences o Costs	• At the patient level, the studies reported trust, satisfaction with the service, ease and speed of access, and quality of advice, which the authors reported were essential for patient acceptance • At the organizational level, the delegation of tasks were essential for reducing physicians' workload, and policy bills such as Canada's Bill 41 and Bill 31 require pharmacists to undergo training for certain conditions could improve patient care and compliance • At the society level, cost-effectiveness studies were often reported, where some studies reported insignificant increase in overall healthcare costs while improving health outcomes and quality of life					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
  ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
• Conditions
  ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe)
  ▪ Diarrhea (non-infectious)
  ○ Public health
  ▪ Sexually transmitted and blood-borne infections (e.g.,
	Community-led pharmacists medication prescribing for travel related concerns (e.g., altitude sickness or vector-borne disease prevention) shows strong satisfaction across studies; however, it requires additional time, education, and collaboration with physicians (38)
	• This review describes the types and outcomes related to community pharmacist-led travel health services
	• Pharmacists providing travel medicine were all certified with additional training related to travel health
	• Pharmacists provided services either independently, in collaboration with a physician, or according to protocols
	• Medications prescribed by pharmacists included altitude sickness prevention, malaria or other vector-borne disease prevention, traveller's diarrhoea prevention, water/food-borne disease prevention, and prevention of STDs and sunburn
	• Generally, patients reported high satisfaction and positive patient experience across all studies
	• Facilitators to accessing pharmacist-led travel health services included increased awareness and advertising of services, strong collaboration with physicians, and sufficient staffing
	• One caveat of pharmacist-led travel health services was that they required additional time and certifications for pharmacists, which can be a burden if not sufficiently resourced
		No	6/10	2022	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) ○ Any other conditions not listed above • Settings ○ Community-based pharmacies • Equity-centred quadruple-aim outcomes ○ Patient experience ○ Provider experiences						
• Services ○ Prescribing • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) ○ Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan) • Conditions ○ Chronic disease prescribing ▪ Chronic respiratory diseases (e.g.,	Antimicrobial prescribing by community pharmacists for acute conditions indicates high satisfaction by patients, is cost-effective, increases accessibility to care, and reduces burden on the primary healthcare settings (3) • This review explored antimicrobial prescribing by community pharmacists • Types of conditions that pharmacists prescribed medications for included, but were not restricted to, uncomplicated urinary tract infections, cold sores, seasonal allergic rhinitis, bacterial conjunctivitis, diaper dermatitis, canker sores, insect bites, mild acne, thrush, athlete's foot, dysmenorrhea, eczema, folliculitis, headache, heartburn, hemorrhoids, impetigo, jock itch, sprain, ringworm, acute pharyngitis (sore throat), acute otitis media, acute bacterial sinusitis, chronic bacterial sinusitis, chronic obstructive pulmonary disease, and pinworms and threadworms (no details on specific medications were provided) • Pharmacist prescribing of antimicrobials took place either independently or in line with supplementary models • Outcomes for pharmacists antimicrobial prescribing included: ○ clinical improvement (four studies) ○ high satisfaction by patients (eight studies)	No	4/9	2019	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
asthma, chronic obstructive pulmonary disease) ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe) ▪ Bacterial skin infections ▪ Folliculitis ▪ Upper respiratory conditions (i.e., cough, cold, sore throat, nasal congestion, sinusitis) ○ Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) ▪ Pharyngitis, including strep throat • Settings ○ Community-based pharmacies • Equity-centred quadruple-aim outcomes ○ Patient experience ○ Costs	○ cost-effectiveness ○ reduced burden and unnecessary prescribing for primary care settings (two studies) ○ fewer adverse events (three studies) ○ improved access to care (seven studies) ○ decreased healthcare utilization (seven studies) ○ increase of appropriate prescribing (three studies)					
• Services ○ Prescribing • Service model	Community pharmacist-led prescribing for HIV pre-exposure prophylaxis may increase accessibility of care (49) • This review describes and evaluates alternative HIV pre-exposure prophylaxis (PrEP) care delivery models, including	No	5/9	2022	No	• Sexual orientation

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions ○ Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) • Settings ○ Community-based pharmacies • Equity-centred quadruple-aim outcomes ○ Patient experience	alternative prescribers (e.g., pharmacists) and/or alternative care settings • Four of eight included studies described the following community pharmacist-led interventions for HIV PrEP, some of which were virtual: 1. Community Pharmacy-Initiated PrEP program 2. One-Step PrEP 3. Pharmacist-Led PrEP Program (P-PrEP) 4. Pharmacist-Led, Same-Day, PrEP Initiation Program • Three of eight included studies described the following combination interventions involving pharmacist prescribing of HIV PrEP and an untraditional care setting: 1. PrEP Model Incorporating Clinical Pharmacist Encounters and Antimicrobial Steewardship Program (ASAP), involving telePrEP initiated by pharmacists 2. Iowa TelePrEP • Interventions were scored in line with the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) Framework ○ Although the third-highest RE-AIM score was achieved by studies involving pharmacist provision of PrEP, the Pharmacist-Led, Same-Day, PrEP Initiation Program tied with Iowa TelePrEP for the lowest RE-AIM score; the latter two interventions' scores may be explained by the inadequacy of their instructions for using mail-in test kits • Most studies involved men who had sex with men; however, the findings were not specific to sexual orientation					
• Services ○ Prescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice,	Pharmacist-led interventions, in collaboration with primary care providers, may improve accessibility of PrEP services, given that there are sufficient measures to ensure patient privacy and adequate staff training (50) • This review explored the role of pharmacists in increasing access to PrEP for treatment of human immunodeficiency virus • Barriers to pharmacists prescribing medications for PrEP include lack of privacy, insufficient staff training, and a lack of protocols and legislations	No	5/9	2022	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
with varying levels of authority) ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions ○ Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) • Settings ○ Community-based pharmacies • Equity-centred quadruple-aim outcomes ○ Patient experience	• Referrals from primary care providers can support pharmacists in supporting with PrEP services • Pharmacists-led interventions can increase the accessibility of PrEP services					
• Services ○ Prescribing • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)	Rural pharmacists may allocate more time with patients, and provide more prescription services with a higher level of care; however, results should be interpreted with caution given the small number of included studies with generally small samples (41) • This review compared differences in delivery of community pharmacists' interventions in rural versus urban settings ○ Limited information was provided on type of medication (e.g., opioids, eye products, oral contraception, hormone therapy)	No	4/9	2017	No	• Place of residence • Gender • Indigenous identity

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

• Conditions
  ○ Chronic disease prescribing
  ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease)
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders)
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood
	• The findings of Canadian-, U.K.-, or U.S.-based studies included:
	  ○ Generally, rural patients were more likely than urban patients to request personal (e.g., contraception-related) advice from the pharmacist, and pharmacists working in rural settings were more likely to spend additional time with patients and discuss personal topics than pharmacists working in urban settings, potentially due to the scarcity of physicians in rural areas
	  ○ Rural pharmacies showed more interest in supporting those living with certain cancers, demonstrated greater willingness to offer opioid substitution treatment, and considered asthma counselling to be a greater part of their role than urban pharmacists
	  ○ The quality of pharmaceutical care provided by rural pharmacists was higher than that of urban pharmacists
	  ○ Although some studies found that urban and rural pharmacies provided similar numbers and types of professional services (e.g., for diabetes and hypertension), other studies found that pharmacists provided more services in relation to dyslipidaemia, tobacco cessation, and hypertension; further, rural pharmacies tended to provide services specific to Indigenous peoples (e.g., herbal medicine)					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
pressure or hypertension) ○ Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) • Settings ○ Community-based pharmacies • Populations ○ People with a history of substance use ○ People living in rural and remote communities • Equity-centred quadruple-aim outcomes ○ Patient experience ○ Provider experiences						
• Services ○ Deprescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)	Community pharmacist roles in deprescribing reduce the prescription and use of unsuitable medications, and may lead to cost savings in some cases; discontinuation is more likely with protocol-based pharmacist-led models than with educational interventions, collaborative physician-led models, or models involving pharmacists' medication review, consultation, reconciliation, or therapeutic management (22) • The impact of pharmacist-led deprescribing in community-based pharmacies was examined • Medications targeted by protocol-based and/or collaborative pharmacist-led deprescribing included benzodiazepines, proton pump inhibitors, non-statin lipid-lowering medications, Potentially Inappropriate Medications, and antidiabetics	No	6/10	2020	No	• None identified

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions ○ Chronic disease prescribing ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease,	○ Protocol-based deprescribing reduced prescribed medications and was seen as the most beneficial of all forms of deprescribing (including educational interventions and those involving only medication review, consultation, reconciliation, or therapy management); however, it did not impact the use of healthcare or mortality rates ○ Collaborative physician-led deprescribing models were found to generate positive outcomes (e.g., decreased use of Potentially Inappropriate Medications, decreased incidence of hypoglycemia, decreased mortality); however, the costs of medication did not change					

Dimension of organizing framework	Declarative title and key findings	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations

hypertensive diseases, high blood pressure or hypertension)
• Settings
  ○ Community-based pharmacies
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
  ○ Costs						

Appendix 6: Detailed data extractions from single studies about the impacts of pharmacist prescribing on the equity-centred quadruple-aim outcomes

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Services
  ○ Prescribing
  ○ Deprescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
  ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
• Settings
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
	Within a collaborative prescribing model and defined scope of practice, pharmacist prescribing versus usual care is expected to lower venous thromboembolism (VTE) cases, decrease healthcare system costs, and increase patient quality-adjusted life-years (QALYs) (45)
	• The study evaluated the cost-effectiveness (Australian dollars) of pharmacist-led versus usual care VTE prophylaxis for high-risk surgical patients in an elective surgery pre-admission clinic, using a decision tree model informed by data from the literature
	• Pharmacist prescribing refers to a collaborative doctor-pharmacist model
	  ○ Clinical pharmacists prescribe medications on the National Inpatient Medication Chart (NIMC), with the prescriptions countersigned by a resident medical officer (RMO)
	  ○ Pharmacists also complete a VTE risk assessment and, within their scope, decide whether to continue or withhold regular medications perioperatively and prescribe VTE prophylaxis based on local and national guidelines after conducting risk and contraindication assessment
	• In both the base-case (with an existing collaborative pharmacy prescribing service) and the alternative scenario (with a newly implemented service), pharmacist prescribing increased the proportion of patients receiving adequate treatment and reduced VTE incidence, leading to cost savings and improved quality of life
	  ○ The per-patient cost savings were $31 (95% CI: –$97 to $160) in the base case and $12 (95% CI: –$131 to $155) in the alternative, with both showing a QALY gain of 0.02 (95% CI: –0.01 to 0.005) and a 95% and 94% probability, respectively, of being cost-effective at a $40,000 willingness-to-pay threshold
	• Pharmacist prescribing improved the appropriateness of VTE prophylaxis in high-risk surgical patients, leading to fewer adverse events (e.g., deep vein thrombosis, pulmonary embolism) and reducing both the costs and quality of life impacts linked to these events
		High	*Publication date:* 2018
			
			Jurisdiction studied: Australia
			
			Methods used: Secondary data analysis
				• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ Population health outcomes ○ Costs				
• Services ○ Prescribing • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions ○ Chronic disease prescribing ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) • Settings ○ Community-based pharmacies ○ Primary care offices and networks ○ Hospitals and specialty care settings • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Population health outcomes ○ Costs	Across a range of sensitivity analyses of key parameters and assumptions in a cost-effectiveness model, full pharmacist management of hypertension (which includes prescribing) emerged as a dominant strategy, delivering both cost savings and improved outcomes (4) • The study aimed to extrapolate the benefits observed in trials of pharmacist interventions for blood pressure control to estimate their potential clinical and cost-effectiveness; the studies informing the model were conducted in settings such as community pharmacies, hospitals, and primary care teams • The full pharmacist intervention involved pharmacist prescribing alongside medication review, patient education, and follow-up visits every one to three months, all delivered within the established core competencies of Canadian pharmacists • In the base case over a 30-year horizon, pharmacist management of hypertension was economically dominant compared to usual care, saving over CA$6,000 per individual while improving health outcomes, including 0.3 additional life-years and 0.4 additional quality-adjusted life-years or QALYs (discounted at 5% annually) • The cost reductions from CVD and end-stage renal disease (ESRD) cases more than offset the intervention costs, resulting in a discounted net savings of CA$6,365 per individual over 30 years • Sensitivity analyses restricting the model's time horizon to five or 10 years, or assuming the intervention ended after three years, showed no calculable cost-effectiveness ratios, as QALYs were equivalent to usual care; this highlights the importance of sustained intervention for long-term effectiveness and value • A key benefit of pharmacist intervention is timely patient access, but its success depends on individuals consistently engaging with the service to achieve meaningful health improvements	High	*Publication date:* 2017 *Jurisdiction studied:* Canada *Methods used:* Secondary data analysis	• None identified
• Services ○ Prescribing ○ Adapting a prescription • Service model ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that	Pharmacist prescribing of nirmatrelvir/ritonavir in a community setting may increase the likelihood that prescriptions align with emergency use authorization (EUA) requirements and appropriate dosing, while achieving clinical outcomes comparable to those seen with prescriptions by physicians, nurse practitioners, or physician assistants (47) • This multi-centre retrospective observational study evaluated pharmacist prescribing of nirmatrelvir/ritonavir by assessing appropriateness of prescriptions per EUA inclusion and exclusion criteria, appropriateness of dosing, and 30-day mortality	High	*Publication date:* 2025 *Jurisdiction studied:* United States *Methods used:* Retrospective EHR review and	• Sex • Age

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

specify conditions, patient criteria and medication choices)
• Conditions
  ○ Public health
• COVID-19
• Settings
  ○ Community-based pharmacies
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
	○ The study compared two groups: patients prescribed by pharmacists and those prescribed by physicians, nurse practitioners (NP), or physician assistants (PA)
	• As a COVID-19 treatment, prescribing nirmatrelvir/ritonavir requires careful review of renal function and medication lists to manage potential drug interactions
	• Pharmacists were authorized under the EUA to prescribe but were limited if renal or hepatic function data were insufficient for drug interaction verification, medication lists were incomplete, or other medication regimens required adjustment
	• Due to the extensive drug interactions caused by nirmatrelvir/ritonavir, Indiana University Health developed a protocol allowing ambulatory care clinical pharmacists to prescribe nirmatrelvir/ritonavir, make minor medication adjustments, and do so without requiring physician or provider approval
	• COVID-19-positive patients called a nurse triage line and were referred electronically to pharmacists; this did not involve patient's primary physician, NP, or PA
	  ○ Pursuant to the protocol, pharmacists evaluated therapy appropriateness, managed drug interactions, and prescribed to the patient's preferred pharmacy, documenting decisions in the electronic health record (EHR)
	• Investigators retrospectively reviewed EHRs to collect patient data, including age, sex, and COVID-19 risk factors, for both groups
	• Patients were more likely to receive an appropriately prescribed and dosed nirmatrelvir/ritonavir prescription from a clinical pharmacist compared to other healthcare providers
	  ○ Results showed that 99.6% of pharmacist prescriptions met EUA requirements compared to 87.5% in the physician/NP/PA group ($p < 0.0001$), and 98.8% of pharmacist prescriptions had appropriate dosing compared to 90.6% in the physician/NP/PA group ($p < 0.0001$)
	• Clinical outcomes, including medically attended visits and mortality, were similar between groups, suggesting pharmacists can safely and effectively prescribe nirmatrelvir/ritonavir for outpatient COVID-19 treatment
			prescribing documentation review	

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient
	Pharmacist-led oral anticoagulant (OAC) prescribing for actionable atrial fibrillation (AF) improved the delivery of appropriate stroke prevention therapy without increasing adverse events or healthcare utilization while achieving high patient satisfaction (23)
	• This prospective, open-label, patient-level randomized clinical trial evaluated whether pharmacist-led OAC prescribing improves stroke risk reduction in actionable (e.g., undertreated or newly diagnosed) AF patients in community pharmacies
	  ○ Actionable atrial fibrillation refers to cases in patients aged 65 or older with at least one additional stroke risk factor who have either untreated known AF or newly diagnosed AF detected through a 30-second single-lead ECG, making them eligible for oral anticoagulation therapy
	  ○ The study compared early pharmacist intervention (treatment group) versus delayed intervention (control group) across 27 community pharmacies
	  ○ In the early intervention group, pharmacists used guideline-based algorithms to prescribe OAC, with follow-ups at one and three months; in the control group,
		High	*Publication date:* 2024
			
			Jurisdiction studied: Canada
			
			Methods used: EHR reviews and clinical assessments; patient interviews and surveys
				• Race/ethnicity
				• Indigenous identity

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

criteria and medication choices)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
• Settings
  ○ Community-based pharmacies
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
  ○ Patient experience
	primary care physicians were notified, and delayed pharmacist intervention occurred if OAC was still suboptimal at three months
	  ○ Pharmacists had independent prescribing authority (Alberta College of Pharmacy) and provided AF education, blood pressure checks, and guideline-based OAC prescribing
	• Race data were collected due to documented health disparities associated with atrial fibrillation; most patients were White (97.5%), with small representation from First Nations, Inuit, Métis, Latin American, South Asian, and West Indian backgrounds
	• At three months, 92.3% (36 of 39) of patients in the early pharmacist intervention group were on guideline-concordant OAC, compared to 56.1% (23 of 41) in the control group ($p < .001$), reflecting a 34% absolute increase and a number needed to treat (NNT) of 3; among the 23 control group patients with appropriate OAC prescriptions, primary care physicians sought prescribing advice from pharmacists in six cases
	• Rates of adverse events were low, with no significant differences in emergency visits (13 vs. 13; $p = .88$) or hospitalizations (4 vs. 6; $p = .55$) between groups; one-year OAC adherence was similarly high in the pharmacist intervention group (91.4% vs. 89.3%; $p = .84$)
	• Patient satisfaction in the pharmacist intervention group was high, with a median overall satisfaction score of 2.0 (IQR 1.0–2.0); interpersonal relationship domain score of 1.2 (IQR 1.0–1.9); quality-of-care domain score of 1.6 (IQR 1.0–2.0); and a median score of 3.0 (IQR 3.0–3.0) regarding potential areas for pharmacist improvement			

• Services
  ○ Prescribing
  ○ Adapting a prescription
  ○ Deprescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
	Pharmacy prescribing patterns in Alberta, Canada differed based on practice setting, the type of pharmacist–physician interaction, and the pharmacist's prescribing authorization status based on a survey (34)
	• This cross-sectional survey examined pharmacists' prescribing practices in Alberta, focusing on reasons for not prescribing, perceived benefits, and differences in prescribing types and frequencies across practice settings (community pharmacy, hospital, other sites, rural versus urban)
	• Prescribing included renewing prescriptions, adapting doses or formulations, substituting unavailable drugs, or initiating therapies
	  ○ Alberta pharmacists can adapt prescriptions, prescribe in emergencies, or prescribe with additional prescribing authorization (APA) for Schedule 1 drugs (excluding controlled substances)
	  ○ Common prescribing contexts were medication reconciliation (84.7%), and various indications such as pain control (88.1%), anticoagulation (74.0%), and mental health (61.2%); pharmacists with APA more often adjusted ongoing medications (63.6%) than initiated new ones (18.2%)
	  ○ The most common form of prescribing was renewing prescriptions to maintain therapy continuity (61.7% reported doing this regularly)
		Medium	*Publication date:* 2024
			
			Jurisdiction studied: Canada
			
			Methods used: Cross-sectional survey
				• Place of residence

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ○ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders)
  ○ Any other conditions not listed above
• Settings
  ○ Community-based pharmacies
  ○ Primary care offices and networks
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	• Reported benefits of pharmacist prescribing included patient convenience (92.3%), better healthcare access (86.9%), system efficiency (85.7%), improved patient outcomes (82.6%), and greater patient understanding of the pharmacist role (62.3%)
	  ○ About half saw physician convenience, physician understanding of pharmacist roles, and patient choice of healthcare provider as additional societal benefits
	• Pharmacist-physician relationships influenced prescribing decisions; 57.2% sometimes refrained due to perceptions of the patient's physician, citing prior experiences (53.5%), concerns of affecting the relationship (32.6%), or the physician's reputation (29.9%)
	• Prescribing patterns differed by practice setting, pharmacist–physician interaction, and prescribing authorization status
	  ○ Relative to those without APA, pharmacists in clinically oriented practices (e.g., hospitals, consultant roles) and those with greater physician contact were more likely to adapt prescriptions or focus prescribing in one disease area, and less likely to renew prescriptions
	  ○ Rural pharmacists prescribed more frequently than urban pharmacists ($p < 0.05$)
	• Those on interprofessional teams were more likely to hold APA than those interacting with physicians mainly through face-to-face or phone contact (54.5% vs. 22.7% and 18.2%)
	• Hospital- and consultant-based pharmacists were more likely than community pharmacists to have APA and to engage in prescription adaptations, with APA holders significantly more likely to adapt prescriptions, focus prescribing in one disease area, and prescribe multiple times daily			

• Services
  ○ Deprescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
	Pharmacist integration in the hospital-in-home (HIH) model enables the identification and correction of medication discrepancies, deprescribing of inappropriate medications, and oversight of home IV therapy to help reduce medication costs (5)
	• This prospective quality improvement study aimed to integrate clinical pharmacists into the HIH model and conduct a formative evaluation of the pharmacist's contributions, focusing on medication discrepancy resolution, cost savings, and cost avoidance
	• As part of the HIH team, pharmacists performed medication reconciliation to reduce discrepancies during care transitions from hospital to home using home video telehealth and provided ongoing medication management
		Medium	*Publication date:* 2021
			
			Jurisdiction studied: United States
			
			Methods used: Review of clinical and administrative data
				• Time-dependent relationships

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions ○ Chronic disease prescribing ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease) ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) ○ Any other conditions not listed above • Settings ○ Hospitals and specialty care settings • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Costs	○ Pharmacists also carried out medication optimization, including deprescribing guided by established protocols, and coordinated the preparation and administration of IV medications • The 102 patients managed in HIH included those with congestive heart failure (56%), chronic obstructive pulmonary disease (14%), infectious diseases (14%), end-of-life care (6%), and diabetes complications (5%) • Between 21 May 2019, and 27 March 2020, pharmacists identified and resolved 453 medication discrepancies: 181 (40%) at discharge and 272 (60%) during post-discharge reconciliation, with the most common error discovered being patients taking additional medications unknown to other healthcare providers; 84 (19%) of these discrepancies were classified as high risk • The pharmacists managed 104 days of home IV therapy, yielding cost savings of US$17,000, avoided US$51,000 by deprescribing 145 inappropriate medications, and contributed to US$1.2 million in cost avoidance through earlier hospital discharges			

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
  ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease)
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
  ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe)
  ▪ Upper respiratory conditions (i.e., cough, cold, sore throat, nasal congestion, sinusitis)
  ○ Public health
  ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP)
• Settings
  ○ Community-based pharmacies
• Populations
	Oregon community pharmacists show a positive intention to prescribe using the Formulary and Protocol Compendia (FPC), with attitudes, subjective norms, perceived behavioural control, and perceived obligation serving as significant predictors of intention; however, actual uptake remains low (42)
	• This cross-sectional survey investigated what influences Oregon pharmacists' decisions to prescribe autonomously, using the Theory of Planned Behavior (TPB) framework to assess their intention to prescribe under the FPC
	• In 2018, Oregon authorized pharmacists to prescribe using the FPC, initially covering devices and supplies (e.g., blood glucose testing supplies, insulin injection aids, spacers), emergency contraception, select cough and cold medications, and limited continuation of therapy (e.g., adding refills)
	  ○ Since then, the FPC has expanded to include treatments for smoking cessation, travel health, HIV pre- and post-exposure prophylaxis, and uncomplicated vulvovaginal candidiasis; however, its uptake among pharmacists remains limited
	• Using a 7-point Likert scale (where 7 is the strongest intention), the mean intention score was 5.0 ± 1.5
	  ○ Attitudes, subjective norms, perceived behaviour control, and perceived obligation were significant predictors of intention to prescribe, while past prescribing behavior was not (Adj R2 = 0.741, $p < .0001$)
	  ○ Attitudes were explained by beliefs about increasing patient access ($p = .0179$), while perceived control was influenced by beliefs about having policies/procedures in place ($p = .004$) and feeling comfortable prescribing ($p = .008$)
	  ○ On the other hand, past prescribing did not predict intention
	• If pharmacists perceive prescribing as unrealistic to implement or feel they lack control over it (both reflecting low perceived behavioral control), this may negatively affect their overall attitudes toward prescribing
	• Publicizing pharmacist prescribing and fostering patient demand could offer an additional pathway to increase the number of pharmacists providing this service
		Low	*Publication date:* 2022
			
			Jurisdiction studied: United States
			
			Methods used: Cross-sectional survey
				• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Provider experiences				
• Services ○ Prescribing • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions ○ Chronic disease prescribing • Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders) ○ Any other conditions not listed above • Settings ○ Community-based pharmacies • Populations ○ People with a history of substance use ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Population health outcomes ○ Patient experience	An outreach intervention involving pharmacist-led, independent prescribing for people experiencing homelessness was feasible and well-accepted, improved engagement with scheduled care, and reduced emergency department use (6) • Non-randomized feasibility study comparing a pharmacist-led independent prescribing outreach intervention with usual care among 24 hospitalized adults experiencing homelessness in Glasgow, Scotland ○ Participants were followed from hospital discharge until death or censor date, with outcomes collected from clinical records • Pharmacist independent prescribers issued a median of two new (IQR 0.3–3.8) and two repeat (IQR 1.3–7.0) prescriptions per patient, addressing untreated or under-treated conditions including infections, mental health, and chronic diseases • The intervention combined independent prescribing with collaboration between pharmacists and homelessness outreach workers, providing a tailored, low-threshold outreach service delivered in temporary accommodations, shelters, and on the streets • The team diagnosed and treated a wide range of physical, mental, and addiction-related conditions ○ 50% received new physical health diagnoses (like deep vein thrombosis (DVT)), 30% received new mental health diagnoses, and 8% were newly diagnosed with opioid addiction • Delivered in community-based and street settings to a highly marginalized population: 75% were in temporary accommodation, 25% were rough sleeping, and 92% had known substance use issues • The intervention group showed reduced ED attendances per patient-year (0.7 vs. 1.6 in usual care), more scheduled outpatient appointments attended (67% vs. 25%), and no deaths during follow-up (versus two deaths in usual care) • All contacted patients agreed to participate, with a median of 7.5 (IQR 3.0–14.2) consultations per patient, and 83% received support for housing, benefits, or advocacy	Medium	*Publication date:* 2021 *Jurisdiction studied:* Glasgow, Scotland *Methods used:* Non-randomized trial	• Place of residence
• Services ○ Prescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under	Implementation of a pharmacist-led initiative in a hospital-based residency clinic was associated with a statistically significant increase in statin prescribing rates among diabetic patients, high physician acceptance of recommendations, and minimal reported adverse effects (7) • The study performed a single-centre, quasi-experimental pre-post intervention study conducted over three months in a hospital-based internal medicine residency clinic ○ The study included adult diabetic patients aged 40–75 not already on statin therapy and scheduled for a primary care appointment	High	*Publication date:* 2019 *Jurisdiction studied:* United States *Methods used:* Quasi-experimental pre-post intervention study	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
collaborative practice, with varying levels of authority) ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions ○ Chronic disease prescribing ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) • Settings ○ Hospitals and specialty care settings • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Population health outcomes • Patient experience ○ Provider experiences	○ A clinical pharmacist and pharmacy resident reviewed patient charts for statin eligibility based on American Diabetes Association guidelines, provided face-to-face or electronic medical record (EMR) based prescribing recommendations to physicians, facilitated statin initiation and delivered patient education and conducted follow-up phone calls within one month to assess for adverse effects and ensure prescription pickup ○ Pharmacists focused on initiating moderate- or high-intensity statins in alignment with American Diabetes Association cardiovascular risk stratification ○ The focus was on statins for atherosclerotic cardiovascular disease prevention (e.g., atorvastatin, rosuvastatin), but individual drug names were not specified • The study reports that statin prescribing increased from 75.6% to 82.6% in eligible patients • Of the 61 recommendations made by pharmacists, 90.2% were accepted (52.5% initiated immediately, 37.7% deferred) • Only one minor adverse effect (headache) was reported; no prescriptions were discontinued due to intolerance • Pharmacists operated under a collaborative prescribing model; they did not prescribe independently, but provided treatment recommendations that physicians implemented			
• Services ○ Prescribing ○ Deprescribing	A clinical intervention involving pharmacists in an academic care setting was associated with a reduction in the number of medications among patients with polypharmacy and	High	*Publication date:* 2022 *Jurisdiction studied:*	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
  ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
• Settings
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
	chronic disease, alongside improvements in clinical outcomes, compared to usual care (8)
	• The study, conducted at NYU Langone Health, compared outcomes between patients receiving a pharmacist-led medication management intervention and those receiving usual care over a four-month period
	  ○ The intervention involved comprehensive medication reviews, deprescribing of inappropriate medications, and optimization of chronic disease therapies
	  ○ Deprescribing scope included deprescribing inappropriate or unnecessary medications and initiating evidence-based therapies for chronic conditions (e.g., initiating sodium-glucose cotransporter (SGLT2) inhibitors like empagliflozin and magnetic resonance angiography (MRA) like spironolactone for heart failure)
	  ○ Pharmacists operated under a collaborative prescribing model, making recommendations and adjustments through a collaborative practice agreement
	  ○ Pharmacist activities also included dose adjustments, therapeutic duplications resolution, and ordering lab tests in collaboration with providers
	• Patients in the intervention group showed a statistically significant reduction in diastolic blood pressure, from 75.82 mmHg to 72.69 mmHg (P = 0.046)
	• A significant improvement in ejection fraction was observed, increasing from 35.60% to 41.46% (P = 0.016) over the four-month follow-up
	• The average number of prescribed medications decreased by 1.00 in the intervention group (P = 0.002), compared to a +0.44 increase in the usual care group
	• 35.2% of patients (25/71) in the pharmacist-led group had medications deprescribed, while 45.1% (32/71) had medications initiated based on guideline-directed medical therapy (GDMT) optimization (e.g., spironolactone, empagliflozin)
	• Reductions in polypharmacy (from 12.69 to 11.69 medications, P = 0.002) and deprescribing of potentially harmful medications (e.g., ibuprofen in congestive heart failure (CHF) patients, unnecessary antihypertensives) suggest potential for reduced adverse drug events and medication costs
			United States
			
			Methods used:
			Retrospective cohort study	

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ Population health outcomes • Patient experience				
• Services ○ Prescribing ○ Adapting a prescription • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions ○ Any other conditions not listed above • Settings ○ Hospitals and specialty care settings • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Population health outcomes ○ Patient experience ○ Provider experiences	A pharmacist-led *Helicobacter pylori* service improved outcomes by addressing barriers, achieving 100% eradication in treatment-naive and 69% in treatment-experienced patients, optimizing care in a gastroenterology clinic (9) • This retrospective chart review study, conducted at Boston Medical Center, evaluated all patients referred to a pharmacist-managed H. pylori treatment service in the gastroenterology clinic between July 2019 and December 2020 ○ Data collected included demographics, prior treatments, prescribed regimens, number of visits, and eradication outcomes ○ The clinical pharmacist was embedded full-time in the clinic, seeing patients in person or via telemedicine for a minimum of three visits per treatment ○ The pharmacists managed 60 referrals for 55 unique patients (10 treatment-naive, 50 treatment-experienced) over five visits per patient ○ The pharmacists were allowed to prescribe full *H. pylori* regimens including bismuth quadruple therapy, levofloxacin-based therapy, and adjust formulations or doses as needed • Eradication was achieved in 100% of treatment-naive patients (six of six tested) and 69% of treatment-experienced patients (22 of 32 tested); 22% of patients were lost to follow-up • The pharmacist identified and addressed barriers such as reporting incorrect prescriptions, incomplete dispensing, patient misunderstanding, nonadherence, and adverse effects • Specific interventions included selecting regimens (for treatment-experienced), adjusting doses for renal function, providing education, organizing medications, resolving insurance/copay, and reporting pharmacy errors • The pharmacist was authorized under a collaborative scope of practice to independently prescribe, adjust, and initiate treatment for treatment-experienced patients, and to order tests under the supervising provider's name • Gastroenterologists reported high satisfaction with the pharmacist's role in managing a complex, hard-to-treat population	High	*Publication date:* 2021 *Jurisdiction studied:* United States *Methods used:* Retrospective chart review study	• None identified
• Services ○ Prescribing ○ Adapting a prescription • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring	Over one-third of U.K. critical care pharmacists were practising as independent prescribers in 2014, primarily improving patient care through medication optimization, error reduction, with most intending to adopt independent prescribing within three years (10) • This national cross-sectional study distributed a questionnaire survey to U.K. critical care pharmacists via the UK Clinical Pharmacy Association in 2014 ○ Survey targeted pharmacists working in adult NHS critical care units, and collected data on demographics, prescribing qualifications, activities, barriers, and perceptions	High	*Publication date:* 2016 *Jurisdiction studied:* United Kingdom *Methods used:* Cross-sectional survey	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

physician oversight or approval) •
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
  ○ Any other conditions not listed above
• Settings
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
  ○ Patient experience
  ○ Provider experiences
	○ Response rate was ~33% (134 responses), with most respondents having ≥2 years of critical care experience and working as part of a multidisciplinary team
	○ Over one-third (37.5%) of respondents were practising independent prescribers (IP) at the time, with over 70% intended to be IPs within three years
	• Prescribing was independent (pharmacists had autonomous authority within their scope), but often conducted collaboratively as part of the critical care team
	○ In patient care, pharmacists routinely contributed to dose adjustments for multi-organ failure, changes in medication route/formulation, correction of prescribing errors, therapeutic drug monitoring, and medicine reconciliation for chronic medications
	○ Medications independently prescribed included gastrointestinal prokinetic agents including laxatives), electrolytes, antimicrobials, nutrition (enteral and parenteral), analgesics (including opioids), anticoagulants (excluding prophylaxis for venous thromboembolism), insulin, vasoactives, and IV fluids
	• Pharmacists with ≥5 years of critical care experience ($p < 0.001$) or who worked as part of a team ($p = 0.005$) were significantly more likely to prescribe independently
	• Positive impacts of independent prescribing reported by pharmacists included improved patient care through optimized prescribing (87%), greater professional satisfaction (80%), improved team integration (69%), and reduced prescribing errors (67%)
	• Their prescribing accounted for ≤5% of new prescriptions in critical care and ≤5% of their clinical time (reported by ~80% and ~70% of IPs respectively)			

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring
	A cost-effectiveness model compared insulin prescriptions for type 2 diabetes mellitus (T2DM) initiated by pharmacists as an early intervention compared to usual diabetes care with physicians initiating this prescription, finding that this novel pharmacist approach reduced long-term health complications, improved QALYs, and was cost-saving or cost-effective depending on how much earlier pharmacist prescribing occurred compared to usual physician care (11)	High	*Publication date:* 2016
			
			Jurisdiction studied: Alberta, Canada
			
			Methods used: IMS CORE diabetes Markov model
				• Race/ethnicity
				• Gender
				• Age

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
• Settings
  ○ Community-based pharmacies
  ○ Primary care offices and networks
• Equity-centred quadruple-aim outcomes
  ○ Population health
  ○ Costs
	• Currently, in Alberta, pharmacists have the advanced practice scope to prescribe insulin and order laboratory tests, thus offering the potential for pharmacists to play a larger role in the early identification and intervention in uncontrolled T2DM
	  ○ Thus, this study investigates the cost-effectiveness of this advanced scope service
	• The original RxING community pharmacist prescribing intervention for T2DM showed promising patient-level effects, and the data from this study alongside data about direct costs, (dis)utility values, and the modelling software use suggest that increasing pharmacists' scope to initiate prescriptions for insulin in patients with uncontrolled T2DM can have population health improvements (e.g. QALYs, life-years, healthcare utilization) and cost benefits
	• In usual care, there is often a significant delay to receive insulin initiation from a primary healthcare provider, whereas pharmacists can initiate an insulin prescription, on average, two years earlier than a physician, which reduces the costs of diabetes-related complications and severe hypoglycemic episodes from earlier intervention, having a cost-saving benefit even with the increase in treatment costs
	  ○ If the pharmacist prescribed insulin one to two years earlier than the physician, there is a cost-savings ($805 savings for one year, $624 for two years) and increased QALY (0.048 or 0.075, respectively) effect, even with the additional cost of insulin compared to their previous treatment plan that was ineffectively controlling T2DM
	  ○ If the pharmacist prescribed insulin three to five years earlier than the physician, the intervention had even greater improvements to QALYs, but was cost-effective rather than cost-saving due to the high cost of drugs
	  ▪ However, the ICER calculation of cost per QALY gained was well below the $50,000 threshold often used in Canada
	  • 3 years: $26 extra, +0.086 QALYs, ICER = $244/QALY
	  • 4 years: $677 extra, +0.094 QALYs, ICER = $6,100/QALY
	  • 5 years: $766 extra, +0.101 QALYs, ICER = $7,613/QALY
	  ▪ This increased cost is due to the increased delay of insulin initiation creating greater health complications
	• The model assumed that 1) patients would be followed by their pharmacist for the first year of insulin initiation and then by their primary care physician thereafter, and that 2) patients were supported by a pharmacist or a physician, but never both for their diabetes management, despite many patients being managed by interdisciplinary care teams in reality			

• Services
  ○ Adapting a prescription
• Service model
  ○ Protocol-driven (e.g., pharmacists may prescribe
	A therapeutic interchange (TI) program for high blood pressure and high cholesterol medications resulted in increased prescription orders, improved formulary adherence, and reduction in health system costs, inappropriate dosing conversions, and inappropriate discharge medications (12)
	• TI programs support integration of care during transitions from the hospital to home care, ensuring that cost-saving substitutions from a non-formulary medication to a
		Medium	*Publication date:* 2018
			
			Jurisdiction studied: California, U.S.
				• Time-dependent relationships

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
• Settings
  ○ Community-based pharmacies
  ○ Hospitals and specialty care settings
• Equity-centred quadruple-aim outcomes
  ○ Costs
	formulary medication that is chemically different but therapeutically equivalent happen in safe and clinically appropriate ways
	• Three classes of drugs were investigated in this study due to the high volumes ordered of these drugs for inpatient care: ACE inhibitors and angiotensin II receptor blockers for high blood pressure, as well as HMG-CoA reductase inhibitors for high cholesterol
	• A clinical decision support system was integrated within the EMR system, for which the subsequent roll-out was investigated in phases, the first being pre-intervention, the second being prescriber TI alerts only, and the third being prescriber alerts alongside pharmacist prescribing authority of these adapted prescriptions
	  ○ The clinical decision support system triggered alerts when non-formulary medications were ordered to suggest a substitution with a formulary medication and provide the appropriate dosage conversions
	  ○ Medications may have been in the formulary while in the hospital, but upon discharge, the patients needed to resume their home medications to ensure appropriate discharge medications
	  ○ When pharmacists had authority to initiate these reviews and substitutions, there was a reduction in inappropriate discharge medications (including inappropriate discontinuation of medications) since the continuation of hospital medications was not automatically continued for home, as well as a reduction in inappropriate dosage conversions when the substitution was initiated
	• Only direct medication costs were used in the estimated annual cost savings equation, so human labour and workflow considerations for successful implementation of TI programs could not be evaluated
			Methods used: Three-phase retrospective single-centre study	

• Services
  ○ Deprescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
  ▪ Neurological disorders (e.g., Alzheimer's and other dementias, epilepsy,
	Interviews with GPs, primary care pharmacists, and care home managers revealed that proactive deprescribing by pharmacists as part of an integrated care team is generally well received since pharmacists are well placed to lead this work and deprescribing is viewed as a worthwhile risk compared to the risks of polypharmacy/over-prescribing (46)
	• When structured medication review was possible, removal of outdated medications benefitted the patient and improved resource use (e.g., medication cost, staff time to order and dispense the prescriptions that no longer provide a clinical benefit to the patient)
	• The care home environment mitigates many of the risks of deprescribing since there is 24/7 nurse monitoring, so the effects of deprescribing can be carefully monitored and quickly adjusted
	  ○ GPs were more hesitant to deprescribe, whereas pharmacists were more likely to investigate a patient's clinical history before making a decision on whether to deprescribe, even when initially hesitant
	• Providers had differing perspectives on proactive deprescribing, especially upon admission into a care home; however, most agreed that it is important to get to know
		High	*Publication date:* 2022
			
			Jurisdiction studied: United Kingdom (Northern Ireland, Scotland, and England)
			
			Methods used: Semi-structured interviews with reflexive thematic analysis (qualitative study)
				• Place of residence
				• Age

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

multiple sclerosis, Parkinson's disease)
• Settings
  ○ Long-term and residential care homes
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	the patient, including the clinical reasons for taking a medication and their history with it, alongside their behaviour and needs, and for the patient to achieve stability after transfer into the care home before adjusting their prescriptions or deprescribing
	• In care homes, medication review meetings are already multidisciplinary with GPs, pharmacists, nurses, and care home managers in attendance, typically occurring every six or 12 months
	  ○ Central nervous system medications (anticholinergics and sedatives) are of particular concern for over-prescribing, especially due to their connection to fall risk and adverse events that may lead to morbidity, hospitalisation, and mortality as population health outcomes
	  ○ There are also several medications with low adverse effects from discontinuation and high rates of over-prescription (e.g., vitamins, topical products, laxatives), so these are medications of interest for deprescribing compared to medications that require more consideration of the patient's clinical history and input from the patient's family
	  ○ It was noted that nurses often initiate deprescribing conversations and contact the pharmacist for their expertise if a strong relationship/team culture existed
	• Structures and systems can support or act as barriers to deprescribing
	  ○ Relationships between providers can enhance opportunities for multidisciplinary structured medicine review and subsequent deprescribing, but also create tensions between roles
	  ○ Having an administrative team to facilitate communication between the care home and pharmacist was a helpful facilitator in some GP practices
	  ○ An opportune moment for multidisciplinary medication review was when repeat prescriptions were being signed off by the GPs before the pharmacists refilled them, prompting conversations about the number and nature of the medications an individual is currently taking
	  ○ While there was not enough available evidence about pharmacists being employed by one or a group of medical practices, teamwork and strong communication emerged as key facilitators of proactive deprescribing
	• Important contextual policies include a recommendation from the English National Overprescribing Report that pharmacists should be responsible for addressing polypharmacy in primary care, alongside a policy recruitment initiative and guidance to bring 6,000 new pharmacists into primary care by 2024 to support structured medication reviews in both primary care and care homes
	  ○ However, governmental guidelines on deprescribing are far less common than for prescribing, and guidelines are not always relevant to the older adult population
	  ▪ The Screening Tool of Older Persons' potentially inappropriate Prescriptions (STOPP) has been designed for this specific purpose			

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	• Additionally, it is still unclear whether national guidance will be enough to support this evidence-based guidance on deprescribing, or whether legislation will also be needed			

• Services
  ○ Prescribing
  ○ Adapting a prescription
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe)
  ▪ Diarrhea (non-infectious)
  ▪ Nausea and vomiting (including preventive medications)
  ○ Any other conditions not listed above
• Settings
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
  ○ People with a history of substance use
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	Advanced practice clinical pharmacists (also referred to as licensed independent practitioners) led an oral chemotherapy monitoring program for patients with multiple myelomas taking oral anti-cancer agents, and while there were comparable levels of care (prescription rates) with this program compared to usual care, provider satisfaction increased (24)
	• GPs, advanced practice pharmacists, and nurses indicated that they would recommend this pharmacist-led program to patients
	• Oral anti-cancer agents are a less invasive and more convenient treatment option, but concerns exist about nonadherence worsening the patient's health and increasing healthcare results for this treatment option
	• Previously, pharmacists could only review oral anti-cancer agent prescriptions for appropriateness, accuracy, and potential drug-drug interactions, providing patient education and follow-up phone calls only for initiation, not for subsequent prescriptions/ongoing review, and requiring physician sign-off before every cycle of treatment
	• These collaborative drug therapy agreements allow pharmacists an expanded role on the interdisciplinary cancer care team, while also standardizing prescription patterns according to evidence-based recommendations
	  ○ As a licensed independent practitioner, pharmacists can be involved in assessment, medication management, symptom management, and the provision of supportive care
	  ▪ They can prescribe immunomodulatory agents (pomalidomide and lenalidomide), make dose modifications based on protocol after adverse events (e.g. for thrombocytopenia and neutropenia), regularly meet with patients to evaluate adherence, tolerance, and toxicities before prescribing refills independently, and order laboratory tests as well as mediations for common side effects and concerns (e.g. diarrhea, nausea, pain management, anticoagulation, long-term antibiotics)
	  ○ Some oral anti-cancer agent programs allow pharmacists to independently propose and sign prescriptions (under a physician's license) while others are more collaborative agreements
	  ○ Protocols were developed to support pharmacists having independent authority over certain aspects of care
	  ○ Responsibility was shifted to the pharmacist for the prescription of immunomodulator therapies, adherence with Risk Evaluation and Mitigation Strategies required by the FDA to ensure benefits outweigh the risks, patient communication, and care coordination
		High	*Publication date:* 2025
			
			Jurisdiction studied: Washington, U.S.
			
			Methods used: Quality improvement methodology
				• Place of residence
				• Culture/ language
				• Sex
				• Age
				• Socio-economic status

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

	• There were several implementation considerations including pharmacist qualifications, EMR compatibility, and sufficient resources to support the advanced scope of pharmacists
	  ○ Pharmacists needed to obtain a national provider identifier and complete the necessary credentials to have this scope of practice, and a collaborative drug therapy agreement needed to be approved
	  ○ Modifications were made to the EMR system (e.g., algorithms that support appropriate dosage and monitoring of immunomodulatory agents, ensuring proper authorization for pharmacist prescribing, and standardizing the documentation notes)
	  ○ A risk stratification program was also developed to find the balance between close patient monitoring and low patient burden for patient outreach frequency
	  ▪ Risk was determined for healthcare utilization, adverse events, and likelihood of nonadherence, resulting in monthly phone contacts for medication management of high-risk patients compared to electronic surveys for low-risk patients that were accompanied by phone calls every three months
	  ○ An administrator role was created to ensure pharmacists had adequate time for their increased scope of practice, so responsibility for survey generations (for the FDA risk management requirements), phone visit and lab appointment scheduling, message management, medication procurement, and triage of staff, patient, and dispensing pharmacy calls were shifted to the new 'oral chemotherapy project coordinator'
	  ▪ It was noted that an additional two full-time equivalent (FTE) pharmacists and an administrative role were needed for this pharmacist-led oral chemotherapy monitoring program
	• Insurance coverage was a major concern of providers that could not be accommodated for in this study			

• Services
  ○ Deprescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
  ▪ Diabetes and kidney disease (e.g., type 1 and
	Pharmacist deprescribing of antidiabetics reduced hypoglycaemia and mortality risk in an elderly diabetic population with well-controlled type 2 diabetes (13)
	• The study assessed hypoglycaemia risk as a primary outcome and hyperglycaemia risk, proportion of patients at goal (A1c), change in A1c, change in medication cost, and all-cause mortality as secondary outcomes from pharmacist-managed deprescribing of antidiabetic medications compared with usual care in an integrated primary healthcare system
	  ○ Under this pharmacist-managed system, pharmacists had prescriptive authority to initiate, adjust, and stop medications directly with patients
	  ○ These pharmacists were clinically trained in relevant areas (i.e., pharmacotherapy, geriatric pharmacy)
	  ○ Specifically, the deprescribing program recruited eligible patients using an internal algorithm that screened EMR records and then received primary care physician approval to be included in the program
		High	*Publication date:* 2019
			
			Jurisdiction studied: United States
			
			Methods used: Retrospective cohort study
				• Age

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
• Settings
  ○ Primary care offices and networks
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
	• Compared to the usual care group, the pharmacist deprescribing group had:
	• A lower risk of hypoglycaemia (1.5% vs. 3.1%, p < 0.02; adjusted odds ratio 0.42. p < 0.01)
	• A greater change in A1c (0.3 vs. 0.2, p < 0.01)
	• Lower all-cause mortality (2.3% vs. 5.6%, p < 0.01; adjusted hazard ratio 0.35, p < 0.01)
	• There were no differences in the pharmacist deprescribing group and the usual care group in hyperglycaemia risk, proportions of patients at goal, or change in medication cost (US $5.2 vs. $5.2)			

• Services
  ○ Deprescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe)
  ▪ Sleep disorders (minor)
• Settings
  ○ Primary care offices and networks
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	General practice pharmacists' (n = 10) self-perceived roles in deprescribing, influences on decision-making, and perceptions of best practice emerged as overarching factors influencing z-drug prescribing behaviour as garnered from semi-structured interviews discussing hypothetical situations concerning the review and prescription of z-drugs (37)
	• This qualitative, semi-structured interview-based study investigated the factors affecting pharmacist decision-making surrounding reviewing and prescribing z-drugs through the exploration of decision-making in realistic clinical vignettes in virtual interviews
	• Currently in England, pharmacists are granted full prescribing rights after completing a post-graduate qualification in 'independent prescribing'; newly qualified pharmacists in 2025/26 will be granted this qualification
	  ○ Clinical pharmacists are embedded in newly formed primary care networks, where they work alongside doctors in general practice and conduct structured medicine reviews with the aim of deprescribing and thus minimizing harm from prescribed medications
	• Three overarching themes emerged:
	  ○ Perceived role of the pharmacist in deprescribing: Participants viewed pharmacists as more hesitant prescribers of z-drugs than doctors, with some expressing anxiety or low self-efficacy about prescribing ability
	  ▪ Participants emphasized the importance of building strong relationships with often sceptical patients to make a case for deprescribing z-drugs
	  ○ Influences on decision-making: Compassionate care approach (participants reported empathizing with patient's insomniac suffering and dependency) and rules-based decision-making (black and white view of the correct use of z-drugs) often conflicted with each other
	  ▪ Patient pressure from older patients made it hard to broker deprescription
	  ○ Perceptions of best practice: Six of the 10 participants viewed best practice as consisting in expectation-setting and fully informing patients on z-drug risks at outset, as well as introducing holistic, non-pharmaceutical interventions in care planning such as long-term therapy treating the underlying issue
		Medium	*Publication date:* 2023
			
			Jurisdiction studied: England
			
			Methods used: Thematic analysis of semi-structure interviews
				• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	• Authors interpreted findings to imply that pharmacists had low self-efficacy when it came to deprescribing z-drugs in chronic insomnia, and recommended training to help clinical pharmacists with shared-care decision-making • Potential implications for population health: ○ Pharmacists viewed themselves as more risk-averse and thorough than medical colleagues in reviewing z-drugs in primary care, which authors contextualize by citing the increased time-pressure faced by GPs; this suggests that a population health outcome of more pharmacist prescribing could be less over-prescribing of z-drugs			

• Services
  ○ Prescribing
  ○ Adapting a prescription
  ○ Deprescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
  ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease)
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders,
	The informal, flexible, and person-centred approach of a prescribing pharmacist supported an outreach service with third sector homelessness agency involvement in facilitating case finding/engagement and healthcare access for unhoused people, with the observed effect of improved health outcomes (14)
	• This study aimed to evaluate the impact of an outreach service led by clinical pharmacists (PHOENIx) on the health outcomes of unhoused people
	• PHOENIx is distinct from other outreach services in the U.K., as it is led by pharmacists as opposed to nurses receiving input from GPs
	• PHOENIx pharmacists usually prescribe any routine primary care medicines, except for opioid agonist treatment and treatment for alcohol withdrawal, both of which are handled by alcohol and drug recovery services in Glasgow
	• Thematic and framework analysis of semi-structured interviews conducted with those having lived experience of homelessness (n = 40, 32 of which had experience with service), service delivery staff, and 10 representatives of agencies working with the service and client group, revealed the following three themes:
	  ○ Case finding and engagement:
	  ▪ There was stakeholder consensus that a) the service was effective at finding those who would otherwise 'fall through the gaps' via capitalizing on windows of opportunity when patients are motivated to seek help and b) the service was 'sticky' in that pharmacists would often continue treating patients after periods of disengagement
	  ▪ Patients described experiences with service in positive terms, citing pre-existing trust of voluntary sector street worker facilitating trust of pharmacist, extended consultation time making them feel respected and listened to, and the convenience and immediacy of response motivating them to engage when they would otherwise not
	  ○ Healthcare access and utilization:
	  ▪ Patients reported that the informality and flexibility of the outreach service mitigated access barriers such as: anxiety being in formal healthcare settings, fear being around other users of specialist homeless healthcare services, fear of loss of confidentiality of diagnosis in using popular (e.g.,
		Medium	*Publication date:* 2021
			
			Jurisdiction studied: Glasgow, Scotland
			
			Methods used: Thematic and framework analysis of semi-structured interviews
				• Place of residence
				• Socio-economic status
				• Disability

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
schizophrenia and delusional disorders, substance use disorders) ▪ Musculoskeletal disorders (e.g., gout, osteoarthritis, osteoporosis, rheumatoid arthritis, juvenile idiopathic arthritis) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) ○ Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) • Settings ○ Community-based pharmacies • Populations ○ People with co-morbidities ○ People with a history of substance use • Equity-centred quadruple-aim outcomes ○ Population health outcomes • Patient experience ○ Provider experiences	HIV) clinics, avoidance of past stigma experienced in formal healthcare settings, and physical immobility ○ Health-related outcomes: ▪ The longer and more informal (pharmacists willing to talk about non-healthcare issues) consultations were cited by patients as enabling increased understanding of health conditions and medication effects, and increased feelings of being respected, the latter spurring them to prioritize their well-being more ▪ Patients reported immediate prescriptions increased their health, as did referrals from staff that connected patients to other primary and secondary providers ▪ Stakeholders observed increased patient adherence to medications • Cumulatively, participants with lived experience of homelessness self-reported the following conditions, among others: ○ chronic obstructive pulmonary disease ○ diabetes ○ angina ○ arthritis ○ cirrhosis ○ HIV ○ osteoporosis ○ depression ○ anxiety ○ schizophrenia ○ substance (e.g., alcohol, crack cocaine, heroin, psychoactive drug, prescription drug) use challenges			
• Services ○ Prescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can	Patient satisfaction rates from consultations with prescribing pharmacists in a collaborative doctor-pharmacist care model were high in both a surgical pre-admission clinic and a sexual health clinic (25) • This survey-based study assessed whether the attitudes of patients might be potential barriers to the implementation of a collaborative doctor-pharmacist care	High	*Publication date:* 2015 *Jurisdiction studied:* Australia	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ○ Public Health
  ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP)
• Settings
  ○ Hospitals and specialty care settings
• Equity-centred quadruple-aim outcomes
  ○ Patient experience
	model, with a specific interest in uncovering elements of pharmacist behaviour linked to patient satisfaction
	• Study was conducted in two settings: A Surgical Pre-Admission Clinic (PAC) and a sexual health clinic
	  ○ At the PAC clinic, pharmacists prescribed the inpatient medication chart to make sure it supported the perioperative agenda, which included VTE prophylaxis
	  ▪ At the PAC, the patients filled out the surveys after a single consultation with prescribing pharmacist
	  ○ At the sexual health clinic, pharmacists prescribed regular HIV medicine but referred to a medical specialist for anything outside of the care plan
	  ▪ At the sexual health clinic, patients filled out the satisfaction survey after each appointment (the first appointment was with the doctor and pharmacist, with the subsequent two appointments only with the pharmacist), and filled out the attitudes toward collaborative model survey after the last appointment
	• Findings:
	  ○ Consultation satisfaction rates were high for both the PAC (182/200 = 91%) and the sexual health clinic (29/34 = 85%), with the majority of patients in both clinics (98% and 97%, respectively) reporting being highly satisfied with the consultation
	  ○ PAC findings:
	  ▪ Spearman's rank correlation with consultation goals found that the pharmacist explaining their role clearly, checking patient understanding, understanding patient concerns, and answering patient questions were strongly associated with patient satisfaction regarding preparedness for surgery
	  ▪ The question that divided opinion the most and produced the highest number of "unsure" responses was on whether patients would like a doctor to double check the pharmacist plan for medication; authors cite this as another reason why the collaborative doctor-pharmacist model would be most highly acceptable to patients
	  ○ Sexual health clinic findings:
	  ▪ All (14/14) patients in the sexual health clinic trusted the pharmacist's ability to prescribe and provide care as good as usual
	  • Patients agreed they would recommend to friends and follow the pharmacist's advice
	  • Patients concurred that the pharmacist understood their health issue, listened to them, took time to answer questions, and was caring
	  ▪ Spearman's correlation found that pharmacist's effective listening and answering of questions, information provision, and checking patient understanding were strongly correlated with patient satisfaction
			Methods used:
			Survey	

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	▪ Patients feeling involved in treatment decisions was highest correlation with satisfaction ▪ Almost two thirds of patients cared more about the quality of care provided than the profession of the provider • Authors suggested their finding of a greater preference for a doctor in the PAC versus the sexual health clinic might be due to the chronic nature of health management in the sexual health clinic, where the pharmacist builds a relationship over several appointments as compared to the single appointment model in PAC			
• Services o Prescribing o Adapting a prescription • Service model o Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions o Chronic disease prescribing ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) • Settings o Hospitals and specialty care settings • Equity-centred quadruple-aim outcomes o Provider experiences	Non-pharmacist clinicians who work collaboratively with clinical pharmacists viewed the incorporation of clinical pharmacists as a way to increase prescribing of sodium-glucose cotransporter inhibitors (SGLT2i) and angiotensin receptor-neprilysin inhibitors (ARNi) to patients with heart failure with reduced ejection fraction (HFrEF) through the overcoming of common barriers to evidence-based prescription such as lack of familiarity with medications, medication costs, insurance coverage, authorization access, medication titrations, and patient assistance programs (26) • This study aimed to deepen the understanding of clinician-perceived barriers and facilitators to the evidence-based practice of prescribing ARNi and SGLT2i in patients with HFrEF • Rapid qualitative analysis of interviews done with clinicians (13 physicians, five advanced practitioners, and two clinic-based pharmacists) affiliated with the Geisinger integrated healthcare delivery system identified major themes related to: o Incorporation of a clinic-based pharmacist can increase prescribing of SGLT2i and ARNi ▪ Clinicians working in sites with embedded clinical pharmacists (seven of the 16 non-pharmacist clinicians interviewed) reported that working with clinical pharmacists in collaborative agreements increased GDMT prescribing via overcoming barriers such as lack of familiarity with medications, medication costs, insurance coverage, authorization access, medication titrations, and patient assistance programs ▪ These clinical pharmacists contributed to EHRs, maintained independent patient schedule, and collaboratively managed patient care via adjusting medication and writing orders o Other pathways, unrelated to pharmacist prescribing, identified were: ▪ clinical inertia, lack of familiarity, knowledge, and comfort with use, and concerns over polypharmacy can contribute to prescribing patterns not aligned with the official guidelines for SGLT2i and ARNi ▪ Perceived and actual cost of prescribing ARNi or SGLT2i can reduce prescribing, which is only exacerbated by lack of visibility of patient prescription coverage, insurance denials of coverage, and complex prior authorization workflows	Medium	*Publication date:* 2024 *Jurisdiction studied:* Pennsylvania, U.S. *Methods used:* Rapid qualitative analysis to identify key themes from semi-structured interviews	• None identified
• Services o Prescribing	Organizational culture, peer/management/multidisciplinary team (MDT) support, and believing prescribing to be integral to pharmacist role were found to be facilitators of	Medium	Publication date: 2017	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
  ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease)
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
• Settings
  ○ Hospitals and speciality care settings
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	active prescribing amongst hospital Pharmacist Independent Prescribers (PIPs) in National Health Service (NHS) hospitals across Scotland (27)
	• This mixed-methods study aimed to investigate hospital PIPs' perception of barrier and facilitators to active prescribing in NHS hospitals across Scotland, and to thereby determine the infrastructure needed to best support active prescribing
	• Participants were active PIPs (n = 65) in the NHS Boards hosting the greatest number of active PIPs, as well as pharmacy managers of those three boards; participants independently prescribed in diverse specialties, namely acute medicine, cardiology, haematology, mental health, oncology, respiratory health, rheumatology, and surgery
	• Themes identified from focus groups and interviews (n = 25) using the Theoretical Domains Framework (TDF) to code were:
	  ○ Knowledge domain:
	  ▪ All PIPs felt they were the most appropriate healthcare professionals to prescribe
	  ○ Beliefs about capabilities domain:
	  ▪ PIPs felt that they, not doctors, should take responsibility for prescribing, as they were competent to do so
	  ▪ Professional confidence to prescribe grew as more colleagues prescribed
	  ○ Environmental context domain:
	  ▪ Having a smaller board size enabled good relationships with the MDT, and made it easier to implement the new prescribing service
	  ▪ PIPs felt supported during the Period of Learning in Practice (PLP) by pharmacy management
	  ▪ PIPs felt supported by their consultants
	  ▪ PIPs felt that high prescribing activity was encouraged by their hospitals having a definite career pathway culminating in prescribing
	  ○ Social influences domain:
	  ▪ PIPs agreed peer support was integral to completing the PLP
	  ▪ PIPs reported having established relationships with their MDT made them feel supported
	  ▪ Seeing nurses become prescribers encouraged them to become PIPs
	  ○ Professional role/identity domain:
	  ▪ PIPs saw themselves as experts in prescribing and thus should take responsibility for it
	  ▪ PIPs saw prescribing as the future of their field
	  ▪ Prescribing brought increased respect in the MDT
	  ○ Beliefs about consequences domain:
	  ▪ Some PIPs saw prescribing as improving efficiency because of less time contacting junior doctors
	  ▪ PIPs refuted worry that junior doctors would be de-skilled by pharmacist prescribing
			Jurisdiction studied: Scotland
			
			Methods used: Mixed-methods, exploratory sequential study (focus groups and interviews, followed by cross-sectional survey)	

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

	• Survey (n = 170) results were consistent with qualitative findings:
	  ○ Compared to inactive PIPs, active PIPs were more likely to have a prescribing role agreed with their manager prior to starting the course (65.4% vs. 45%, $p < 0.05$), and to feel more supported by pharmacy management (72.4% vs. 47.5%, $p < 0.01$) and the MDT (90% vs. 72.5%, $p < 0.05$)
	  ○ 15 PIPs cited needing backfill of their post before they could take on prescribing, six of these 15 were in haematology/oncology roles, which require double checking of prescribing			

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe)
  ▪ Allergic rhinitis
  ○ Public health
  ▪ Herpes simplex (cold sores)
• Settings
  ○ Community-based pharmacies
• Populations
  ○ People living in rural and remote communities
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	Self-reported prescribing activity by direct patient care community pharmacists in Nova Scotia increased from pre-COVID-19 to during COVID-19, while barriers and facilitators to pharmacist prescribing were identified relative to pharmacist perceptions (35)
	• The goal of this study was to identify barriers and facilitators to pharmacist prescribing by determining the extent of self-reported pharmacist prescribing pre- and during COVID-19 pandemic, and explore the relationship between these factors and self-reported prescribing
	• The 190 respondents to the survey make up 14.2% of the of the direct patient care community pharmacist population in Nova Scotia per the Nova Scotia College of Pharmacists (N = 1,338)
	• Since the pandemic, activity in prescribing significantly increased for diagnosis supported by protocol (29.0% vs. 58.9%, $p < 0.01$), minor and common ailments (25.3% vs. 34.7%, $p = 0.03$), and preventative medicine (22.1% vs. 33.2%, $p < 0.01$)
	• The top 10 conditions prescribed for by the Nova Scotia pharmacist respondents before COVID-19 are compared to during COVID-19:
	  ○ Before: (1) herpes simplex (cold sores), (2) uncomplicated cystitis (bladder infections), (3) travel vaccines, (4) oral fungal infection (thrush), (5) allergic rhinitis, (6) smoking cessation, (7) contraceptive management, (8) gastroesophageal reflux disease, (9) non-travel vaccines, (10) mild acne
	  ○ During: (1) uncomplicated cystitis (bladder infections), (2) contraceptive management, (3) herpes simplex (cold sores), (4) oral fungal infection (thrush), (5) gastroesophageal reflux disease, (6) herpes zoster treatment, (7) allergic rhinitis, (8) smoking cessation, (9) non-travel vaccines, (10) dyspepsia
	• Findings indicate a positive perception of prescribing being part of a pharmacist's social/professional role and identity
	• *Beliefs about consequences* was found to have the largest influence on increased prescribing activity:
	  ○ Authors speculate this is related to expanded provincial government coverage of additional prescribing activities, with conditions (e.g., uncomplicated cystitis, shingles, contraception management) that have more immediate beneficial impacts
		High	*Publication date:* 2023
			
			Jurisdiction studied: Nova Scotia, Canada
			
			Methods used: Cross-sectional self-administered electronic survey (mixed method triangulation design)
				• Socio-economic status
				• Place of residence

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
	○ It is also possible that more experience with prescribing has increased self-efficacy for prescribing and minimized the perceptions of negative consequences • Although s*ocial influences* was the second highest domain for predicting increased prescribing frequency, it was one of the most common barriers to prescribing: ○ Many respondents indicated they had issues with asking patients to pay for unfunded services ○ The general lack of public knowledge around prescribing assessment services available, as well as the eligibility for and limitations to those services, was a further barrier ○ Some respondents indicated that patients were not willing to wait or book appointments and expected pharmacists to always be available ○ Pressure from employers to assess for prescribing at greater frequency than possible and a perception of feeling pressured to provide 'quantity over quality'			
• Services ○ Prescribing • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions ○ Chronic disease prescribing ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases,	The remunerations model offered to pharmacists in an Alberta study on management of hypertension had little to no perceived influence on their patient care decisions and actions, but pharmacists are wary of a strict pay-for-performance model (39) • The fee-for-service (FFS) model and pay for performance (P4P) model are two models with which jurisdictions pay for the patient care activities provided by pharmacists in Alberta • The goal of the study was to obtain the experience of pharmacists practicing under both models within the Alberta Clinical Trial in Optimizing Hypertension (RxACTION), which evaluated blood pressure (BP) reduction achieved by pharmacists with independent prescribing authorization for patients with uncontrolled hypertension • Eight pharmacists were interviewed and asked about the benefits/risks of each payment approach on pharmacy business and practice, the effect (if any) of payment on clinical decision-making and interprofessional relationships, and the pharmacists' perceived ability to impact incentivized outcomes • The RxACTION study was limited to Alberta pharmacists with APA • All participants stated that, within the confines of the study, the specific payment model made no difference in their treatment of the patient • Three key themes emerged: (1) Comfort with a 'stable' payment model, (2) transformation of practice, and (3) payment for services in the future ○ (1) Pharmacists were comfortable with the perceived stability of the FFS model for income, and identified several concerns with the P4P method (outlined below) ○ (2) Pharmacists reported the transformative effect of the study (independent prescribing authorization) on their practice, some having gained confidence in the provision of clinical services to their patient population, and others adjusting previous practice habits	Medium	*Publication date:* 2017 *Jurisdiction studied:* Alberta, Canada *Methods used:* Interviews, quantitative analysis (RxACTION study) followed by qualitative analysis (present study)	• Socio-economic status

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

high blood pressure or hypertension)
• Settings
  ○ Community-based pharmacies
  ○ Primary care offices and networks
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
  ○ Costs
	○ (3) A preference emerged for future models to consider a blend of both service count– and performance-driven metrics in a hybrid fashion based on concerns about strict P4P (outlined below)
	• Concerns with P4P: Pharmacists found that it relied too much on cooperation and action by the patient, introduced risk of pharmacists focusing on performance metrics over patient well-being (taking advantage of their position as a trusted health professional), and that the P4P model may be perceived negatively by patients and other health professionals (they may misinterpret pharmacist intent as desire to receive a bonus)
	• Authors recommend that efforts to implement P4P should therefore be gradual and accompanied with a robust evaluation plan, and that policymakers must be cognizant of potential negative consequences on both incentivized and non-incentivized outcomes			

• Services
  ○ Prescribing
  ○ Adapting a prescription
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
• Conditions
  ○ Chronic disease prescribing
• Settings
  ○ Hospitals and specialty care settings
  ○ Rural and remote healthcare facilities
  ○ **Ambulatory care**
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Provider experiences
	While oncology pharmacists utilize their independent prescribing to initiate and continue supportive care medications for cancer patients, the prescribing volume varied greatly among pharmacists (43)
	• The goal of this study was to describe and quantify independent prescribing of oncology pharmacists working in adult, ambulatory cancer centres in Alberta
	• A review of oncology pharmacist prescribing in the electronic health record, ARIA was conducted, analyzing prescriptions from 1 January 2018 to 30 June 2018
	• Of 37 pharmacists included in the study, 32 (86%) work at the two tertiary cancer centres in Alberta (in Edmonton and Calgary), and five pharmacists work at smaller regional sites in less urban areas
	• Over six months, 3,474 prescriptions were ordered by 33 clinically deployed pharmacists using their additional prescribing authorization (APA), with a median of seven prescriptions per month
	• Prescription volume varied among prescribers, with nine pharmacists (27%) writing less than 10 prescriptions and seven (21%) writing over 200 prescriptions during the study period
	  ○ The top seven prescribers wrote 67% of the total prescriptions within the six-month study period
	• Pharmacists most often initiated a new medication (50%), or continued existing prescriptions (46%), with dose adjustment being in the minority (4%)
	• The lowest volume prescribers were clinically deployed for just a half day per week and the top prescribers worked three or more days in clinic per week
	• Pharmacists in regional care centres had a higher prescription volume than those in tertiary care centres (but this was not deemed statistically significant)
		Medium	*Publication date:* 2023
			
			Jurisdiction studied: Alberta, Canada
			
			Methods used: Retrospective chart review, cross-sectional analysis
				• Place of residence

• Services
  ○ Prescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to
	Pharmacist prescribing provided in addition to usual care resulted in significant improvements in patient BP and in the proportion of patients with initially uncontrolled hypertension reaching their target blood pressure (15)	High	*Publication date:* 2015
			
			Jurisdiction studied: Alberta, Canada
				• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
prescribe within their scope of practice without requiring physician oversight or approval) ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Chronic disease prescribing ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) • Settings ○ Community-based pharmacies ○ Primary care offices and networks ○ Hospitals and specialty care settings • Populations ○ People with comorbidities • Equity-centred quadruple-aim outcomes	• The aim of this study was to assess the impact of independent pharmacist prescribing on BP control in community-dwelling patients with uncontrolled hypertension • 248 patients in 23 communities in Alberta, Canada were enrolled in RxACTION, and patients were randomized into an intervention group with enhanced pharmacist care (n = 181) and a usual care group (n = 67) ○ A high proportion of patients (78%) were already taking antihypertensive therapy at baseline • All participating pharmacists had Additional Prescribing Authorization (APA) and practiced in community (20 pharmacists), hospital outpatient clinics (two pharmacists), or primary care clinic settings (six pharmacists) • Pharmacists received training in BP assessment and treatment based on the Canadian Hypertension Education Program (CHEP) guidelines and had access to hypertension experts for consultation as required • The independent prescribing authorization of pharmacists was hypothesized to overcome the ceiling effect that may be associated with recommendation-based care • The six-month pharmacist intervention (assessment, patient education, prescribing, and follow-up) reduced blood pressure by 6.6/3.2 mm Hg more than usual pharmacist and physician care (P = 0.0006) • Patients in the intervention group were 2.3 times more likely to reach recommended blood pressure targets • Pharmacists providing care for intervention group patients were also remunerated for their services as part of a secondary study (also included in data extractions) • Authors determined that pharmacists are primary care providers who are well situated to help address the burden of hypertension in the community, and that the findings of this study could have important public health implications		*Methods used:* Randomized controlled trial	

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ Population health outcomes				
• Services ○ Deprescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Chronic disease prescribing • Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ○ Any other conditions not listed above • Settings ○ Long-term and residential care homes • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Population health	A collaborative, pharmacist-led, collaborative medication deprescribing program initiative was associated with a 79% success in ≥50% reduction in medications recommended to be deprescribed (28) • The goal of this study was to determine the feasibility of a deprescribing program in hospice patients with limited life expectancy in an integrated healthcare delivery organization between 1 September 2018 to 31 January 2019 ○ No specific protocol for deprescribing was created, with clinical hospice pharmacists using their judgment to determine the appropriateness of each medication ○ The deprescribing initiative gave pharmacists the prescriptive authority to initiate, adjust, or stop medications under physician-approved collaborative practice agreement protocols ○ Harm versus benefit was weighed for each medication with the goal of discontinuing medications to maximize symptom management and reduce polypharmacy ○ Hospice pharmacists closely collaborated with other members of the healthcare team, including nurses, nurse practitioners, and primary care and subspecialty physicians • Of 97 patients, 54% were women, and 55% were white, with the two most common primary diagnoses being cancer (59%) and cardiovascular diseases (16%), followed by other conditions encompassing protein calorie malnutrition and amyloidosis (10.3%), cerebrovascular conditions (8.3%), pulmonary conditions (6.1%), and renal/hepatic conditions (1%) ○ The average patient age was 77.5 (± 23.7) ○ The number of comorbidities ranged from zero to six (average of two per patient) ○ A large proportion (81%) of the study population died prior to the end of the study period, with approximately 45% dying within 20 days • Approximately 80% of patients and 70% of prescriptions were successfully deprescribed, with only three prescriptions restarted due to recurrence of the original indications ○ This success was most common in cardiovascular and other non-specific medications (e.g., antibiotics, pain medications, psychotropic medications, vitamins) • Each additional encounter with a hospice pharmacist was associated with a threefold increase in the odds of a ≥50% elimination of medications recommended to be deprescribed • This study lacked a control group due to limitations in both the budget and scope • Authors suggest future studies, utilizing a control group, should focus on determining the effectiveness of the program and the impact on quality of life	Medium	*Publication date:* 2021 *Jurisdiction studied:* San Jose, California, U.S. *Methods used:* Retrospective analysis (pharmacist-led, single arm, single-centred)	• Age • Place of residence

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Services
  ○ Prescribing
  ○ Adapting a prescription
  ○ Deprescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
  ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices)
• Conditions
  ○ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic
	The preferred model among community pharmacists in New Zealand was the minor ailments prescribing model, followed by the independent prescribing model; the delegated prescribing model had the lowest overall value and was the least favourable among community pharmacists (36)
	• The primary focus of this study was to examine community pharmacists' preferences for attribute levels defining prescribing models in primary care in New Zealand and to better understand how these attributes can influence their preferences for providing a prescribing service; attributes included:
	  ○ prescribing model
	  ○ location of prescribing service
	  ○ education requirement for prescribing
	  ○ professional service fee charge
	  ○ change in pharmacist prescriber's income
	• Collaborative prescribing was the non-medical prescribing model in place within New Zealand, where pharmacists could work in a collaborative team to initiate, modify, and discontinue medication
	  ○ While community pharmacists, in particular, did not engage in this model at the time of this study, they did, however, provide 'pharmacist-only' medicines and prescription medicines under the Standing Order legislation, such as Wafarin
	• Pharmacists had an overwhelming tendency to prefer providing the prescribing service from the community pharmacy as opposed to the general practitioner's practice; community pharmacies can be viewed as more accessible alternatives for patients as they have longer hours of operation and multiple locations
	• Community pharmacists preferred charging a professional service fee via a consultation fee
	• Prescribing alternatives increased among pharmacists working in larger, interdisciplinary teams and pharmacists preferred working with extended teams
	• Pharmacists working in rural and remote areas were significantly more likely to prefer adopting a delegated prescribing model
		Medium	*Publication date:* 2020
			
			Jurisdiction studied: New Zealand
			
			Methods used: Quantitative methods – discrete choice experiment
				• Place of residence

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
attack, anticoagulation management) ○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe) • Settings ○ Community-based pharmacies ○ Primary care offices and networks ○ Rural and remote healthcare facilities • Populations ○ People living in rural and remote communities • Equity-centred quadruple-aim outcomes ○ Provider experiences				
• Services ○ Prescribing ○ Adapting a prescription ○ Deprescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) ○ Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions ○ Chronic disease prescribing ▪ Cardiovascular diseases (e.g., heart failure)	Specialist heart failure pharmacists can improve health outcomes for patients by providing a holistic review of medication and optimizing guideline-directed medical therapy in patients with heart failure with reduced ejection fraction within three months (16) • The aim of this study was to evaluate the impact of implementing specialist heart failure pharmacist prescribing clinics in the U.K. • Leveraging the use of pharmacist-led heart failure optimization clinics can help to bridge the gap between increasing healthcare demands and limited healthcare resources ○ These clinics were designed to help the facilitation of converting patients to sacubitril/valsartan, reaching a capacity of six clinics and 30 patients/week • Heart failure pharmacists supported medication adherence and when necessary conducted home visits and virtual consultations (during the COVID-19 pandemic) ○ Patients were counselled on their diagnosis, educated on their medications, and assessed for adherence; patient-specific interventions were recommended if non-compliance was observed (no mention of specific interventions) ○ Medicine optimization was achieved when a patient is on maximum tolerated doses of the four-disease modifying heart failure medical therapies, with no scope for further up-titration; pharmacists would work within the recommendations of locally approved guidance, but there was no set protocol mentioned	Medium	*Publication date:* 2024 *Jurisdiction studied:* United Kingdom *Methods used:* Plan-Do-Study-Act (PDSA) methodology	• Place of residence • Time-dependent relationships

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Settings
  ○ Hospitals and specialty care settings
• Populations
  ○ People with co-morbidities
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
  ○ Patient experience
	• The use of angiotensin converting enzyme inhibitor (ACEi), angiotensin II receptor blocker (ARB), and angiotensin II receptor-neprilysin inhibitor (ARNI) increased from 22% to 92%, while beta blocker use increased from 72% to 92%
	• A primary barrier for healthcare teams is supporting patient adherence to medication; adopting a broader multidisciplinary team, which integrates heart failure pharmacists, can help to re-design patient pathways and address these challenges			

• Services
  ○ Prescribing
  ○ Adapting a prescription
  ○ Deprescribing
• Service model
  ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval)
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
	Most prescribing by oncology pharmacists occurs in ambulatory care settings in Alberta, with antiemetic medication being the most frequently prescribed treatment; APA was particularly beneficial for ambulatory patient assessment and follow-up (40)
	• The primary aim of this study was to describe the setting and practice of oncology pharmacists with prescribing authorization using a descriptive, cross-sectional survey using a web-based questionnaire
	  ○ A particular focus was placed on APA status, as pharmacists are able to renew or adapt prescriptions irrespective of APA status
	• Oncology pharmacists with APA status participated in medication reconciliation, counselling/education, and ambulatory patient assessment
	• Oncology pharmacists further prescribed the following categories of medicines:
	  ○ steroids
	  ○ immunosuppressants
	  ○ anti-diarrheals
	  ○ antibiotics
	  ○ anticoagulants
	  ○ analgesics
	  ○ laxatives
	  ○ endocrine therapy
	  ○ anti-hypertensives
	  ○ anti-hyperglycemics
	• Facilitators for prescribing included competence, self-confidence, and impact on patient care/perceived impact on work environment
	• Primary motivators to apply for additional prescribing authorization was relevancy to practice, increased efficiency, and advancement of the profession
		Medium	*Publication date:* 2019
			
			Jurisdiction studied: Alberta, Canada
			
			Methods used: Cross-sectional survey
				• Place of residence

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe) ▪ Nausea and vomiting (including preventive medications) ○ Any other conditions not listed above • Settings ○ Hospitals and specialty care settings • Equity-centred quadruple-aim outcomes ○ Population health outcomes ○ Patient experience ○ Provider experiences ○ Costs				
• Services ○ Prescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Chronic disease prescribing ▪ Musculoskeletal disorders (e.g., gout, osteoarthritis, osteoporosis, rheumatoid arthritis, juvenile idiopathic arthritis) ▪ Throat ○ Public health ▪ Pneumonia • Settings ○ Hospitals and specialty care settings	Remote preoperative pharmacist consultations led to improved prescribing standards and surgical experiences for patients, while reducing the burden on post-discharge healthcare systems (29) • The primary focus of this study was to evaluate the impact of an innovative, patient-centred approach to day case arthroplasty on patient outcomes ○ Preoperative pharmacist consultations involved addressing perioperative medication concerns, promoting patient empowerment, and reducing length of stay ▪ Remote consultations were conducted one- to two- weeks before admission, and consisted of: 1) reviewing all electronic notes; 2) phone calls with patients to confirm medication history, give perioperative guidance on medication, answer questions, and integrate patients into the shared decision-making process for their discharge prescription; 3) discussion with broader surgical team/anaesthetist to note any medicine issues; and 4) provide discharge prescriptions electronically and dispense it to the ward prior to admission ○ The integration of wider multidisciplinary teams, involving pharmacists, was critical to the functioning of day case arthroplasty surgeries • Patient and provider experiences were found to be extremely positive, with patients who had previous surgical procedures reporting improved patient experiences (73% reporting “much better” and 27% reporting “better” experiences) ○ 100% of patients felt more confident with taking their medication upon a consultation with the pharmacist	Medium	*Publication date:* 2024 *Jurisdiction studied:* United Kingdom *Methods used:* Consultations	• Place of residence

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations

• Populations
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
• Patient experience
  ○ Provider experiences
  ○ Costs
	• Upon analysis of the pre-intervention (review by medical staff) and intervention (pharmacist consultations) groups, it was noted that a different discharge prescription would have been generated for 38.8% of patients in the pre-intervention group
	  ○ The use of VTE prophylaxis and NSAIDs were the main prescribing medicines that would have seen amendments and/or changes made
	• The intervention group had a significant reduction in post-discharge healthcare encounters, including less frequent visits to their general practitioner			

• Services
  ○ Prescribing
  ○ Adapting a prescription
  ○ Deprescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
  ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease)
  ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management)
  ▪ Musculoskeletal disorders (e.g., gout)
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus,
	The role of a perioperative and prescribing pharmacist in elective surgery multidisciplinary teams helped to improve the accuracy of medication histories, inpatient prescribing, discharge prescriptions for high-risk patients, and medication management (30)
	• The main focus of this study was to evaluate the impact of perioperative and prescribing pharmacists in multidisciplinary team settings for elective surgeries
	  ○ The medication history of those in the intervention group, featuring pharmacists conducting medication histories for their patients, had fewer errors than the control group
	  ▪ The process for medication history-taking among the perioperative and prescribing pharmacist included contacting patients one week prior to their surgery via telephone and obtaining a 'best possible medication history' using a medication reconciliation form (prescription items confirmed with a second source, such as records/charts from community pharmacies, nursing homes, or general practitioners)
	  ▪ Additional patient demographic information was gathered, including number of home medications, type of surgery, comorbidities (e.g., hypertension, hyperlipidemia, diabetes, ischemic heart disease, cerebrovascular accident, transient ischemic attack, chronic kidney disease)
	• Errors in medical history taking often involved the following categories of medication: analgesics, cardiovascular, anticoagulants, antiplatelet, endocrine, gastrointestinal, central nervous system, and respiratory
	  ○ The control group had five 'extreme errors,' which included the omission of warfarin, apixaban, and furosemide frequency of administration in a heart failure patient
	• The findings from the study found more perioperative and prescribing pharmacists obtained a complete discharge summary with a medication list and ensured that high-risk medication, such as anticoagulants, antiplatelet, respiratory, and gastrointestinal medication were used appropriately and withheld prior to the patient's surgery
		Medium	*Publication date:* 2020
			
			Jurisdiction studied: Victoria, Australia
			
			Methods used: Randomized prospective interventional study
				• Place of residence
				• Age
				• Socio-economic status

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) ○ Any other conditions not listed above • Settings ○ Hospitals and specialty care settings • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Population health outcomes • Patient experience ○ Provider experiences ○ Costs				
• Services ○ Prescribing ○ Adapting a prescription • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Chronic disease prescribing ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including	Observed from patient experiences of pharmacist independent prescriber-led clinics, the multidisciplinary approach to inclusion of pharmacist review of patients, and patient-specific pharmacist prescribing behaviours, are notable instances of pharmacist scope of practice positively influencing patient experience in a specific cardiology setting (17) • The goal of the study was to qualitatively explore patient experiences of attending a dedicated pharmacist independent prescriber (PIP)-led clinic focused on post-myocardial infarction (MI) left ventricular systolic dysfunction (LVSD), ○ Clinics were designed to improve medication optimisation via pharmacist independent prescribing, and past instances of pharmacist-led clinics are cited in lieu of design specifics ○ Pharmacists also performed patient physical examination (including blood pressure/pulse measurement, pitting for edema and chest auscultation) and venepuncture ○ In the clinics, patients were typically reviewed by pharmacists at two weekly intervals until medications were judged to be optimised ○ Consultant cardiologists provided medical support and clinical governance to pharmacists • Twelve patients were verbally recruited to this study by three PIPs from two large acute teaching hospitals and one district general hospital • The median patient age was 67.5 years, and 10 of 12 patients were male • Thematic analysis of patient interviews generated six themes: ○ Multidisciplinary working was acknowledged by patients to improve the delivery of post-MI care, participants understood the unique perspective brought by	Medium	*Publication date:* 2020 *Jurisdiction studied:* Scotland, U.K. *Methods used:* Qualitative one-to-one semi-structured interviews (in-person)	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) • Settings ○ Primary care offices and networks ○ Hospitals and specialty care settings • Populations ○ People with co-morbidities • Equity-centred quadruple-aim outcomes ○ Patient experience	pharmacist review, and inclusion of pharmacists in cardiology team was believed to bring additional benefit ○ Satisfaction: Patients considered pharmacist reviews valuable, citing professionalism and attention to detail ○ Patients expressed confidence in the pharmacist, where pharmacist demeanour helped patients reduce stress, especially in ongoing reviews where the pharmacist could build rapport, alleviate concern, and build understanding ○ Comparative care: Participants felt that the pharmacist clinic was more informative than other services and preferred having that additional knowledge ○ Prescribing behaviours: Patients appreciated how the prescribing of medicines was undertaken; it was important that changes to drug therapy were incremental and unhurried, and that pharmacists were able to adjust and resolve potential adverse effects of medicines at the point of car ○ Monitoring: Participants were reassured by regular review that pharmacists were carefully assessing the impact of medication changes • The clinic delivers a positive initial patient experience, but more research is needed to understand longer-term patient experiences, the impact of similar models on medication taking behaviours, and the experiences of carers and other members of the multidisciplinary team • The small study size and potential weaknesses of a semi-structured interview methodology are limiting factors of this study			
• Services ○ Prescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Chronic disease prescribing • Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack,	No statistically significant differences in initiation rates of statin prescription were observed between clinical pharmacist practitioners who independently prescribe versus remote pharmacists or remote student pharmacists pending prescriptions for approval by a primary care provider (53) • This review examines differences in initiation rates of statin prescription for patients with diabetes between clinical pharmacist practitioners (CPPs), compared to remote pharmacists or remote student pharmacists pending prescriptions for approval by a primary care provider • The CPP designation allows pharmacists to engage in direct patient care, such as prescribing medications, in clinical settings under the supervision of a physician • 34.9% of included patients filled their statin prescription; initiation rates were not statistically different with a rate of 36.7% for CPPs, 28.2% for remote pharmacists, and 36.7% for remote student pharmacists	High	*Publication date:* 2024 *Jurisdiction studied:* North Carolina, U.S. *Methods used:* Retrospective chart review	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
anticoagulation management) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) • Settings o Community-based pharmacies o Primary care offices and networks • Populations o People with co-morbidities • Equity-centred quadruple-aim outcomes o Population health outcomes				
• Services o Prescribing o Adapting a prescription • Service model o Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions o Chronic disease prescribing ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease) ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic	Less than half of Brazilian pharmacists surveyed issue prescriptions in their practice, and those that do so most commonly prescribe over-the-counter medications(51) • A survey was administered examining pharmacist prescribing practices and related perceptions in Brazil • In Brazil, pharmacists are able to prescribe over-the-counter medications independently, but must have evidence of prior diagnosis and enter into agreements with the prescriber or healthcare institution for prescription-only medications • 41.3% of outpatient pharmacists surveyed had prescribed medications over the past three years, most frequently at a minimum of four times/month (12.1%) • Among pharmacists who issued prescriptions, these were more commonly prescriptions for over-the-counter medication (42.0%) compared to prescription-only medications (4.6%) • Other activities pharmacists engaged in under collaborative agreements most frequently included dosage adjustment (2.6%) and prescription renewals (2.3%) • Pharmacists most commonly prescribed medication for headache (30.8%), heartburn (30.8%), muscular pain (30.2%), cold/flu (29.8%), fever (27.9%), and cough (27.9%); however, they also prescribed medication for gastrointestinal symptoms, contraception, mental health, diabetes, dyslipidemia, asthma, hypertension, and PrEP/PEP • Most surveyed pharmacists reported familiarity with national pharmacist prescribing regulations, and indicated that prescribing is part of a pharmacist's role, with benefits for patients; that said, pharmacists overall were ambivalent vis-à-vis their responsibility over patient outcomes when they prescribe	High	*Publication date:* 2024 *Jurisdiction studied:* Brazil *Methods used:* Cross-sectional survey	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders) ▪ Musculoskeletal disorders (e.g., gout, osteoarthritis, osteoporosis, rheumatoid arthritis, juvenile idiopathic arthritis) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) o Minor ailments (e.g., beyond the 21 for which B.C. pharmacists can currently prescribe) ▪ Fever o Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) • Settings o Community-based pharmacies o Primary care offices and networks	• While most surveyed pharmacists reported sufficient competency for the prescribing of over-the-counter drugs, they were relatively less confident around the prescribing of prescription-only drugs • Identified barriers to pharmacist prescribing include inadequate staff and physical infrastructure, high administrative burden, insufficient training from physicians, internal insecurity surrounding prescribing, and the potential for pharmacist prescribing to harm pharmacist–physician relationships			

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
○ Hospitals and specialty care settings • Equity-centred quadruple-aim outcomes ○ Population health outcomes ○ Provider experiences				
• Services ○ Deprescribing • Service model ○ Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions ○ Chronic disease prescribing ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension) • Settings ○ Long-term and residential care homes • Equity-centred quadruple-aim outcomes ○ Provider experiences	Facilitators of pharmacist-led deprescribing of antihypertensives in long-term care include confidence, benefit to the patient, and information/resources, while barriers include lack of experience using prescribing authority, support from patient families and physicians, risk-related evidence, and time (44) • Facilitators of pharmacist-led deprescribing of antihypertensives include pharmacist confidence, perception that deprescribing is beneficial to the patient, and adequate availability of information and resources • Barriers of pharmacist-led deprescribing include infrequent use of independent prescribing authority by pharmacists in regular practice, resistance from patient families and physicians, lack of evidence regarding risks of deprescribing, and time required for the task	High	*Publication date:* 2025 *Jurisdiction studied:* Alberta, Canada *Methods used:* Pre- and post-intervention survey of a randomized controlled trial	• None identified
• Services ○ Prescribing • Service model ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority) • Conditions ○ Opioid agonist treatment	In the first year of CPPs prescribing buprenorphine medication treatment for opioid use disorder (B-MOUD), 4.8% of Veterans within the Veterans Health Administration (VHA) received a prescription from a CPP and 86.9% of episodes of care involving a CPP had a 90-day retention, suggesting that CPP prescribing of buprenorphine may increase its accessibility and retention rates (52) • CPPs have the ability to prescribe and manage patient medications under collaborative agreements, and may prescribe controlled substances in certain states • Over one year 4.8% of Veterans who have a prescription for B-MOUD within the VHA received their prescription from a CPP, and 16.6% exclusively received their prescriptions from a CPP • CPPs initiated 2.7% of B-MOUD prescriptions and 4.2% of episodes of care involved a prescription from a CPP	High	*Publication date:* 2025 *Jurisdiction studied:* United States *Methods used:* Retrospective cohort study	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
▪ Combined buprenorphine and naloxone (Suboxone) ▪ Extended-release buprenorphine injection (Sublocade) • Populations o People with a history of substance use • Equity-centred quadruple-aim outcomes o Population health outcomes	• 86.9% of episodes of care involving CPP prescriptions had a 90-day retention; this retention rate is markedly higher than the standard 30–50% previously observed within most care delivery settings			
• Services o Prescribing • Service model o Independent (e.g., pharmacists have autonomous authority to prescribe within their scope of practice without requiring physician oversight or approval) • Conditions o Chronic disease prescribing ▪ Chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease) ▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) ▪ Neurological disorders (e.g., Alzheimer's and other dementias, epilepsy, multiple sclerosis, Parkinson's disease)	Pharmacist prescribing, when supported by collaborative team structures and adequate training, enhances patient care, improves service efficiency, and represents a high-value use of healthcare resources, with minimal systemic barriers to implementation (31) • The study is based on a three-round Delphi study, engaging experienced pharmacist prescribers and stakeholders across sectors • While the study did not examine or report on specific medications or clinical conditions that pharmacists prescribed for, pharmacists worked in diverse specialties, namely: anticoagulation, antimicrobials, musculoskeletal and joint pain, clinical research and cardiology, critical care, diabetes and hypertension, heart failure, infections, mental health, nephrology, neurodevelopmental disorders, osteoporosis, palliative care, and respiratory medicine • Pharmacist prescribing allowed direct, timely patient management, reducing the need for referrals and streamlining service delivery • Strong collaboration with medical teams empowered pharmacists to use their full scope of training, boosting prescribing confidence and impact • Although training prescribers is costly, enabling pharmacists to apply their prescribing skills represents excellent return on investment; the study found that failure to leverage these skills means wasted investment and untapped potential in pharmacy workforce capabilities • The study revealed only one key barrier (out of 127 issues raised across rounds) – suggesting that obstacles are generally personal or context-specific, rather than inherent to pharmacist prescribing itself • Facilitators were much more numerous, with 28 consensus statements reinforcing pharmacist prescribing as widely advantageous, subject to minor contextual adjustments	Medium	*Publication date:* 2021 *Jurisdiction studied:* United Kingdom *Methods used:* Consensus, Delphi technique	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
▪ Mental and substance use disorders (e.g., depressive disorders, anxiety and mood disorders, schizophrenia and delusional disorders, substance use disorders) ▪ Musculoskeletal disorders (e.g., gout, osteoarthritis, osteoporosis, rheumatoid arthritis, juvenile idiopathic arthritis) ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension				
• Services o Deprescribing • Service model o Protocol-driven (e.g., pharmacists may prescribe according to standardized protocols and guidelines that specify conditions, patient criteria and medication choices) • Conditions o Public health ▪ Sexually transmitted and blood-borne infections (e.g., chlamydia, gonorrhea, herpes simplex, HIV, hepatitis B and C), including HIV Pre-exposure Prophylaxis (HIV PrEP) • Settings o Hospitals and specialty care settings	Implementing a pharmacist-led deprescribing protocol in the emergency department significantly increases antibiotic-free days, addresses a critical gap in post-discharge culture follow-up, and enhances antimicrobial stewardship efforts by safely discontinuing unnecessary antibiotics based on negative urine and sexually transmitted infection (STI) test results (48) • The study evaluated whether implementing a pharmacist-led deprescribing protocol in the emergency department (ED) could increase antibiotic-free days for patients who were discharged with antibiotics despite negative urine or STI test results • Led to a more than twofold increase in antibiotic-free days – from 35.1% (163/465 days) in the pre-intervention group to 80.5% (150.5/187 days) in the post-intervention group; this highlights the effectiveness of pharmacist follow-up in safely discontinuing unnecessary antibiotics after negative urine or STI cultures • Pharmacy residents, under supervision of board-certified critical care pharmacists and ED physicians, contacted patients post-discharge using a standardized script • Antibiotics were discontinued only if patients were asymptomatic, and follow-up counselling was provided, ensuring clinical appropriateness and safety in the deprescribing process o Pharmacy residents and clinical pharmacists implemented a pharmacist-driven protocol to deprescribe empirically prescribed antibiotics for patients discharged from the ED subsequently testing negative for urinary tract infections or STIs	High	*Publication date:* 2023 *Jurisdiction studied:* Illinois, U.S. *Methods used:* Single-centre, prospective, observational, pre-post intervention study	• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
• Equity-centred quadruple-aim outcomes ○ Population health outcomes	• In addition to reducing unnecessary medication use, the protocol improved patient education, supported appropriate symptom-based assessment, and saved clinician time			

• Services
  ○ Prescribing
• Service model
  ○ Supplementary (e.g., pharmacists have a formal partnership with a doctor and can prescribe within the boundaries of a pre-determined clinical management plan)
• Conditions
  ○ Chronic disease prescribing
  ▪ Diabetes and kidney disease (e.g., type 1 and type 2 diabetes mellitus, chronic kidney disease, hypertensive diseases, high blood pressure or hypertension)
• Settings
  ○ Community-based pharmacies
• Equity-centred quadruple-aim outcomes
  ○ Population health outcomes
	Pharmacist-initiated prescribing for type 2 diabetes in community pharmacy settings leads to sustained improvements in glycaemic control, demonstrating pharmacists' critical role in chronic disease management and primary care integration (18)
	• Evaluated the impact of pharmacist-initiated basal insulin prescribing on diabetes management, it specifically focused on patients with poorly controlled type 2 diabetes and aimed to test pharmacists' expanded scope within primary care over a one-year period
	• In the RxING trial's 12-month follow-up, patients managed by pharmacists maintained a mean 1.8% decrease in HbA1c, demonstrating that pharmacist-led diabetes management achieves durable improvements in blood glucose control
	• The trial empowered community pharmacists to initiate basal insulin based on collaborative practice protocols; patients receiving pharmacist-initiated insulin saw marked improvements in HbA1c, underlining pharmacists' capacity to independently manage complex chronic therapy
	• Beyond insulin initiation, pharmacists optimized medication regimens, titrations, and patient education, contributing to better adherence, improved risk factor control, and overall enhanced chronic disease management
	• The RxING follow-up highlighted how integrating prescribing pharmacists in primary care strengthens continuity of care, supports patient monitoring, and embeds pharmacists more deeply in chronic disease treatment pathways
		Medium	*Publication date:* 2015
			
			Jurisdiction studied: Canada
			
			Methods used: Prospective
				• None identified

• Services
  ○ Prescribing
• Service model
  ○ Collaborative (e.g., pharmacists work as part of an interdisciplinary team and can initiate, modify, and monitor prescriptions under collaborative practice, with varying levels of authority)
• Conditions
  ○ Chronic disease prescribing
	The collaborative pharmacist prescribing model in the ED significantly improves medication safety, accuracy, and guideline adherence compared to the usual medical prescribing model (54)
	• This research trialled a novel collaborative pharmacist prescribing model within a busy metropolitan Australian ED to evaluate whether pharmacists working alongside medical practitioners could improve the safety, accuracy, and guideline adherence of inpatient medication charts, specifically addressing prescribing errors, documentation quality, and VTE prophylaxis
	  ○ The study did not explicitly focus on or discuss specific medical conditions beyond VTE risk assessment and related prescribing
	• The study demonstrated that medication charts prepared under the collaborative pharmacist prescribing model had markedly fewer prescribing errors, only a 16% error rate compared to 78% in the usual medical prescribing group ($p < 0.001$)
		High	*Publication date:* October 2022
			
			Jurisdiction studied: Australia
			
			Methods used: Randomized controlled trial
				• None identified

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
▪ Cardiovascular diseases (e.g., acute myocardial infarction, atrial fibrillation, heart failure, ischemic heart disease including cholesterol management, stroke, haemorrhagic stroke, ischemic stroke, transient ischemic attack, anticoagulation management) • Settings o Hospitals and specialty care settings • Equity-centred quadruple-aim outcomes o Patient experience	• The intervention group showed substantially better documentation practices, including higher rates of adverse drug reaction (ADR) recording (91% vs. 61%, p = 0.002) and slow-release medication indication (89% vs. 47%, p = 0.009) • Medication charts in the pharmacist-led group also contained significantly fewer error-prone abbreviations and more complete indication documentation, supporting clearer communication and safer medication administration • Medication orders in the collaborative pharmacist group perfectly matched the patients' medication histories and agreed pharmaceutical plans, with zero undocumented omissions, missed doses, or discrepancies (vs. 8.3%, 2.4%, and multiple discrepancies respectively in the control group; all p < 0.001) • Documentation of VTE risk assessment was universal (100%) in the pharmacist collaborative group, compared to only 13% in the medical prescribing group (p < 0.001) • Guideline-concordant VTE prophylaxis prescribing was 100% in the intervention arm versus 61% in the control arm, highlighting improved adherence to clinical guidelines and potential for better patient outcomes • This confirmed the feasibility of a pharmacist collaborative prescribing model where admitting medical practitioners and credentialed pharmacists worked as a team			

Appendix 7: Documents excluded at the final stage of reviewing

Document type	Hyperlinked title
Evidence synthesis	Evaluation of inappropriate antibiotic prescribing and management through pharmacist-led antimicrobial stewardship programmes: A meta-analysis of evidence
	The pharmacy care plan service: Evaluation and estimate of cost-effectiveness
	Pharmacist-mediated deprescribing in long-term care facilities: A systematic review
	Patient and pharmacist perspectives on pharmacist-prescribed contraception: A systematic review
Single study	Cost-utility analysis of medication review with follow-up for cardiovascular outcomes: A microsimulation model
	Examining influences on antibiotic prescribing by nurse and pharmacist prescribers: a qualitative study using the Theoretical Domains Framework and COM-B

References

1. Babashahi S, Carey N, Jani Y, Hart K, Hounsome N. Costs, consequences and value for money in non-medical prescribing: a scoping review. *BMJ Open* 2023; 13(5): e067907.
2. Poh EW, McArthur A, Stephenson M, Roughead EE. Effects of pharmacist prescribing on patient outcomes in the hospital setting: a systematic review. *JBI Database System Rev Implement Rep* 2018; 16(9): 1823-1873.
3. Wu JH, Khalid F, Langford BJ, et al. Community pharmacist prescribing of antimicrobials: A systematic review from an antimicrobial stewardship perspective. *Can Pharm J (Ott)* 2021; 154(3): 179-192.
4. Marra C, Johnston K, Santschi V, Tsuyuki RT. Cost-effectiveness of pharmacist care for managing hypertension in Canada. *Can Pharm J (Ott)* 2017;150(3): 184-197.
5. Emonds EE, Pietruszka BL, Hawley CE, Triantafylidis LK, Roefaro J, Driver JA. There's no place like home – Integrating a pharmacist into the hospital-in-home model. *J Am Pharm Assoc (2003)* 2021; 61(3): e143-e151.
6. Lowrie R, Stock K, Lucey S, et al. Pharmacist led homeless outreach engagement and non-medical independent prescribing (Rx) (PHOENIx) intervention for people experiencing homelessness: A non-randomised feasibility study. *Int J Equity Health* 2021; 20(1): 19.
7. Vincent R, Kim J, Ahmed T, Patel V. Pharmacist statin prescribing initiative in diabetic patients at an internal medicine resident clinic. *J Pharm Pract* 2020; 33(5): 598-604.
8. Chan M, Plakogiannis R, Stefanidis A, Chen M, Saraon T. Pharmacist-Led Deprescribing for Patients With Polypharmacy and Chronic Disease States: A Retrospective Cohort Study. *J Pharm Pract* 2023; 36(5): 1192-1200.
9. Bhat S, Nunes D. Pharmacist-managed helicobacter pylori treatment service within a gastroenterology clinic: Workflow and real-world experiences. *Ann Pharmacother* 2022; 56(2): 162-169.
10. Bourne RS, Whiting P, Brown LS, Borthwick M. Pharmacist independent prescribing in critical care: results of a national questionnaire to establish the 2014 UK position. *Int J Pharm Pract* 2016; 24(2): 104-113.
11. Brown S, Al Hamarneh YN, Tsuyuki RT, Nehme K, Sauriol L. Economic analysis of insulin initiation by pharmacists in a Canadian setting: The RxING study. *Can Pharm J (Ott)* 2016; 149(3): 130-137.
12. Kang A, Thompson A, Rau J, Pollock A. Effects of clinical decision support and pharmacist prescribing authority on a therapeutic interchange program. *Am J Health Syst Pharm* 2018; 75(17 Supplement 3): S77-S81.
13. Hui RL, Chang CC, Niu F, et al. Evaluation of a Pharmacist-managed antidiabetic deprescribing program in an integrated health care system. *J Manag Care Spec Pharm* 2019; 25(8): 927-934.
14. Johnsen S, Cuthill F, Blenkinsopp J. Outreach-based clinical pharmacist prescribing input into the healthcare of people experiencing homelessness: a qualitative investigation. *BMC Health Serv Res* 2021; 21(1): 7.
15. Tsuyuki RT, Houle SK, Charrois TL, et al. Randomized trial of the effect of pharmacist prescribing on improving blood pressure in the community: The Alberta Clinical Trial in Optimizing Hypertension (RxACTION). *Circulation* 2015; 132(2): 93-100.
16. Campbell G, Doherty C, D'Silva A, Carr-White G, Webb J, Ismail TF. Implementation and evaluation of specialist heart failure pharmacist prescribing clinics. *Int J Clin Pharm* 2025; 47(1): 8-14.
17. Speirits IA, Boyter AC, Dunlop E, Gray K, Moir L, Forsyth P. Patient experiences of pharmacist independent prescriber-led post-myocardial infarction left ventricular systolic dysfunction clinics. *Int J Pharm Pract* 2021; 29(1): 55-60.
18. Al Hamarneh YN, Sauriol L, Tsuyuki RT. After the diabetes care trial ends, now what? A 1-year follow-up of the RxING study. *BMJ Open* 2015; 5(8): e008152.
19. Ibrahim K, Cox NJ, Stevenson JM, Lim S, Fraser SDS, Roberts HC. A systematic review of the evidence for deprescribing interventions among older people living with frailty. *BMC Geriatr* 2021; 21(1): 258.

20. Syrnyk M, Glass B. Pharmacist interventions in medication adherence in patients with mental health disorders: a scoping review. *Int J Pharm Pract* 2023; 31(5): 449-458.

21. Jebara T, Cunningham S, MacLure K, Awaisu A, Pallivalapila A, Stewart D. Stakeholders' views and experiences of pharmacist prescribing: A systematic review. *Br J Clin Pharmacol* 2018; 84(9): 1883-1905.

22. Buzancic I, Kummer I, Drzaic M, Ortner Hadziabdic M. Community-based pharmacists' role in deprescribing: A systematic review. *Br J Clin Pharmacol* 2022; 88(2): 452-463.

23. Sandhu RK, Fradette M, Lin M, et al. Stroke risk reduction in atrial fibrillation through pharmacist prescribing: A randomized clinical trial. *JAMA Netw Open* 2024; 7(7): e2421993.

24. Indorf A, Kwok M, Jao M, et al. Enhancing multiple myeloma care: Implementation of pharmacist-led prescribing of immunomodulatory drugs in an academic medical setting. *Clin Lymphoma Myeloma Leuk* 2025; 25(6): e424-e434.

25. Hale A, Coombes I, Stokes J, Aitken S, Clark F, Nissen L. Patient satisfaction from two studies of collaborative doctor-pharmacist prescribing in Australia. *Health Expect* 2016; 19(1): 49-61.

26. Pradhan AM, Lussier ME, Nguyen M, Voyce SJ, Wright EA. Qualitative evaluation to understand barriers and facilitators to prescribing angiotensin receptor-neprilysin inhibitors (ARNi) and sodium-glucose cotransporter inhibitors (SGLT2i) in patients with heart failure with reduced ejection fraction (HFrEF). *J Am Pharm Assoc (2003)* 2024; 64(6): 102224.

27. Fisher J, Kinnear M, Reid F, Souter C, Stewart D. What supports hospital pharmacist prescribing in Scotland? – A mixed methods, exploratory sequential study. *Res Social Adm Pharm* 2018; 14(5): 488-497.

28. Le V, Patel N, Nguyen Q, et al. Retrospective analysis of a pilot pharmacist-led hospice deprescribing program initiative. *J Am Geriatr Soc* 2021; 69(5): 1370-1376.

29. Fitzpatrick K, Addie K, Shaw M, et al. Implementing an innovative, patient-centered approach to day case arthroplasty: improving patient outcomes through remote preoperative pharmacist consultations. *Eur J Hosp Pharm* 2024; 31(4): 321-326.

30. Nguyen AD, Lam A, Banakh I, Lam S, Crofts T. Improved medication management with introduction of a perioperative and prescribing pharmacist service. *J Pharm Pract* 2020; 33(3): 299-305.

31. Graham-Clarke E, Rushton A, Marriott J. A Delphi study to explore and gain consensus regarding the most important barriers and facilitators affecting physiotherapist and pharmacist non-medical prescribing. *PLoS One* 2021; 16(2): e0246273.

32. Walpola RL, Issakhany D, Gisev N, Hopkins RE. The accessibility of pharmacist prescribing and impacts on medicines access: A systematic review. *Res Social Adm Pharm* 2024; 20(5): 475-486.

33. Piraux A, Bonnan D, Ramond-Roquin A, Faure S. The community pharmacist as an independent prescriber: A scoping review. *J Am Pharm Assoc (2003)* 2024;64(6): 102192.

34. Guirguis LM, Hughes CA, Makowsky MJ, Sadowski CA, Schindel TJ, Yuksel N. Survey of pharmacist prescribing practices in Alberta. *Am J Health Syst Pharm* 2017; 74(2): 62-69.

35. Grant A, Rowe L, Kennie-Kaulbach N, et al. Increased self-reported pharmacist prescribing during the COVID-19 pandemic: Using the Theoretical Domains Framework to identify barriers and facilitators to prescribing. *Res Social Adm Pharm* 2023; 19(1): 133-143.

36. Raghunandan R, Howard K, Marra CA, Tordoff J, Smith A. Identifying community pharmacist preferences for prescribing services in primary care in New Zealand: A discrete choice experiment. *Appl Health Econ Health Policy* 2021; 19(2): 253-266.

37. Kallis TJ, Allinson M. Factors affecting clinical pharmacist decision-making when reviewing and prescribing z-drugs in primary care: a qualitative interview study. *Int J Clin Pharm* 2023; 45(5): 1176-1183.

38. Kc B, Alrasheedy AA, Leggat PA, et al. Types and outcomes of pharmacist-managed travel health services: A systematic review. *Travel Med Infect Dis* 2023; 51: 102494.

39. Rosenthal MM, Desai N, Houle SKD. Pharmacists' perceptions of pay for performance versus fee-for-service remuneration for the management of hypertension through pharmacist prescribing. *Int J Pharm Pract* 2017; 25(5): 388-393.

40. Au B, Dersch-Mills D, Ghosh S, et al. Implementation of additional prescribing authorization among oncology pharmacists in Alberta. *J Oncol Pharm Pract* 2019; 25(3): 584-598.
41. Howarth HD, Peterson GM, Jackson SL. Does rural and urban community pharmacy practice differ? A narrative systematic review. *Int J Pharm Pract* 2020; 28(1): 3-12.
42. Wash A, Moczygemba LR, Anderson L, Pye T. Using the Theory of Planned Behavior to assess community pharmacists' intention to prescribe using the Formulary and Protocol Compendia. *Res Social Adm Pharm* 2022; 18(12): 4056-4064.
43. Hynes K, Folkman F, Dersch-Mills D, Marin H, Ghosh S, Chambers C. Prescribing practices of oncology pharmacists working in ambulatory cancer centers in Alberta. *J Oncol Pharm Pract* 2023; 29(8): 1965-1973.
44. Vucenovic A, Kraut RY, Manca DP, Sadowski CA. Barriers and facilitators to pharmacist-led deprescribing of antihypertensives in long-term care: A survey-based study. *Basic Clin Pharmacol Toxicol* 2025; 137(1): e70060.
45. 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 Serv Res* 2018; 18(1): 749.
46. Birt L, Wright DJ, Blacklock J, et al. Enhancing deprescribing: A qualitative understanding of the complexities of pharmacist-led deprescribing in care homes. *Health Soc Care Community* 2022; 30(6): e6521-e6531.
47. Bomkamp JP, Isom C, Wells ML. EVALPAX: Evaluation of a pharmacist-driven protocol for nirmatrelvir/ritonavir prescribing in a community hospital system. *Am J Health Syst Pharm* 2025; 82(2): 65-72.
48. Wang Y, Knobloch K, Lovett S, Lyons N, Rech MA. A pharmacist-driven deprescribing protocol for negative urine and sexually transmitted infection cultures in the emergency department increases antibiotic-free days. *Am J Health Syst Pharm* 2024; 81(3): e83-e89.
49. Kamitani E, Mizuno Y, DeLuca JB, Collins CB, Jr. Systematic review of alternative HIV preexposure prophylaxis care delivery models to improve preexposure prophylaxis services. *AIDS* 2023;37(10): 1593-1602.
50. Cernasev A, Melton TC, Jasmin H, Barenie RE. A qualitative systematic literature review of the role of U.S. pharmacists in prescribing Pre-Exposure Prophylaxis (PrEP). *Pharmacy (Basel)* 2023; 11(1): 9.
51. Milani GJ, Damasceno LT, Tiguman GMB, Aguiar PM. Assessment of the implementation of pharmacist prescribing: Challenges and pathways for ambulatory practice. *Res Social Adm Pharm* 2024; 20(9): 870-879.
52. Baylis JD, Jorgenson TL, Pals HE, et al. Clinical pharmacist practitioners prescribing of buprenorphine for opioid use disorder. *Drug Alcohol Depend* 2025; 271: 112663.
53. Hayes M, Gregory P, Smith B, et al. Assessment of embedded versus remote pharmacist versus remote student pharmacist outreach on statin prescribing. *J Am Pharm Assoc (2003)* 2024; 64(4S): 102127.
54. Ogilvie M, Nissen L, Kyle G, Hale A. An evaluation of a collaborative pharmacist prescribing model compared to the usual medical prescribing model in the emergency department. *Res Social Adm Pharm* 2022; 18(10): 3744-3750.

Ali A*, Mishra S*, Waddell K, Ciurea P, Cura J, Dass R, Sivanesanathan T, Alam S, Goodale G, Grewal E, MacLean Y, Phelps A, Bhuiya AR, Whitelaw H, Bustamante D, Wilson MG. Rapid evidence synthesis: Impacts of pharmacist prescribing on the equity-centred quadruple-aim outcomes. Hamilton: McMaster Health Forum, 24 July 2025.

Citizen partner acknowledgement: We are thankful to our citizen partners, Michelle Wan and Nicole Pallone, for their contribution to the rapid evidence synthesis by providing feedback that was incorporated into the final report.

The rapid-response program through which this synthesis was prepared is funded by the British Columbia Ministry of Health. The McMaster Health Forum receives both financial and in-kind support from McMaster University. The views expressed in the rapid evidence synthesis are the views of the authors and should not be taken to represent the views of the British Columbia Ministry of Health or McMaster University.

*Shared first authorship