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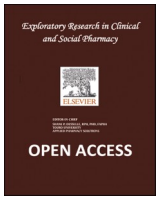

Screening and referral programs for diabetes and cardiovascular disease: Can community pharmacists bridge the care gap?

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ABSTRACT

Background and Objectives: Heart disease and diabetes are leading causes of death in the U.S., with timely screening, referrals, and education being critical for effective treatment. The Community-based Valued-driven Care Initiative (CVCI) aimed to develop, implement, and evaluate the feasibility of delivering patient-centered care interventions for high priority disease states in community pharmacies. This article focuses specifically on two of the selected interventions, both of which were screening and referral (S&R) programs for the prevention and treatment of cardiovascular disease (CVD) and diabetes (DM) respectively. This exploratory evaluation was designed as an effectiveness-implementation hybrid Type II study. Its objectives were to assess both implementation and preliminary program effectiveness using mixed data.

Methods: Fifteen community pharmacies opted to implement one of the two programs over a 12-month period. Implementation feasibility involved examining program adoption rates by sites and patients; acceptability, appropriateness, feasibility, and intent to sustain use survey scores; and pharmacists' interviews. Program effectiveness was based on patient referral rates, physician follow-up communication rates, and perceived outcomes, collected via patient logs, surveys, and interviews.

Results: Two of the 15 sites discontinued participation, yielding an 87 % adoption rate. Patient adoption varied based on contact and screening rates, due to differences in patient recruitment, staffing, and workflow. Pharmacist acceptability, compatibility, and feasibility remained high throughout implementation; however, only three pharmacy sites planned on continuing offering the programs. All at-risk patients were appropriately referred based on screening results, with 65 % having their screening results communicated to their primary healthcare providers. The programs were perceived as beneficial, increasing pharmacists' knowledge and motivation, enhancing relationships with patients, and producing an impact on patients'' health.

Discussion: Results highlight the implementation feasibility and preliminary outcomes of delivering DM and CVD S&R programs in community pharmacies. However, despite these positive results, most pharmacies did not intend to continue the programs, underscoring the continued need for sustainable clinical services models in non-traditional settings. Success with broader implementation will require a paradigm shift in support of community pharmacists as clinical care extenders.

1. Introduction

Heart disease and diabetes are the first and seventh leading causes of death in the United States.[1] Per the Centers for Disease Control and Prevention (CDC), about 695,000 people in the United States died from heart disease in 2021 (or 1 in every 5 deaths). Associated expenditures

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include about $216 billion per year in healthcare system cost and an additional $147 billion in lost productivity.[2] Often, symptoms of heart disease go unnoticed by patients until a major cardiovascular (CV) event, such as a heart attack or stroke.[3,4] Likewise, diabetes is on the rise, with diabetes-related deaths surging 16 % on average over a 2 year period (2020, 2021) compared to pre-pandemic levels.[5] More than 37 million adults or 11.3 % of the US population live with diabetes, including 8.5 million undiagnosed patients. Another 96 million or 38 % of the US adult population have prediabetes.[6]

Both conditions can be diagnosed and treated effectively given timely screening, referrals, and education. It is recommended that all patients between the ages of 40 and 75 be screened regularly for their risk of cardiovascular disease (CVD).[4] Patients at moderate to high risk for major CV events can reduce their risk through interventions such as lifestyle modification, smoking cessation, and medications. Similarly, the US Preventative Services Task Force (USPSTF) recommends screening for all adults 35 to 70 years old at least every 3 years or more frequently based on risk factors for diabetes.[7] Uncontrolled diabetes can be effectively managed through physical activity, dietary changes, and medication.

The shift to value-based (or outcomes-based) care (where providers are rewarded based on patient outcomes and quality of care rather than volume of services), [8] the burden placed on primary care, [9,10] and the increasing care gap present unique opportunities for community pharmacies to expand access to patient care services. As experts in pharmacotherapy and healthcare professionals, pharmacists can play a significant role in reducing the burden of chronic disease and improving patient health in diabetes, dyslipidemia, and hypertension.[11] Community pharmacists are particularly well positioned to provide patient care services, including screenings, point-of-care testing, education, referrals, and medication management. They are considered one of the top trusted professions, with 94 % of Americans also living within 5 miles of a community pharmacy.[12,13] As demonstrated by frequency of visits (four times annually for PCPs, but 35 times annually for community pharmacy), community pharmacies are accessible healthcare points for patients in need.[14]

Although scarce, published examples of community pharmacies effectively transitioning to value-based care are emerging.[15] Pharmacy networks, such as CPESN, have surfaced to improve quality of care and patient outcomes by offering services beyond conventional prescription dispensing.[16] This shift, however, has fallen short of a full scalable community pharmacy transformation for a number of reasons, including limited efforts to systematically explore the feasibility of delivering patient care interventions in community pharmacy settings. For instance, based on a review of the literature on the effectiveness of pharmacist-provided care delivered in community pharmacies, Blalock and colleagues reported the evidence to be limited compared to other settings.[17] They specifically highlight the need for rigorous, systematic research, including inquiries into the effectiveness and implementation feasibility of these interventions in community pharmacies. This recommendation is noted in later reviews as well, particularly for services focused on secondary prevention (e.g., screening and referral programs).[18–20]

The Community-based Valued-driven Care Initiative (CVCI), funded by a grant from the National Association of Chain Drug Stores (NACDS) Foundation, aimed to develop, implement, and evaluate the feasibility of delivering patient-centered care interventions for three high priority disease states, including CVD, diabetes, and depression/anxiety, in community pharmacies. These interventions were implemented in 9 pharmacy organizations, including standalone pharmacies, both national/regional chains and independents, and grocery stores pharmacies (22 total pharmacy sites). Each intervention was split into two programs, a screening & referral (S&R) program and a full program consisting of medication management and 6 health education sessions. The initiative occurred over a 3-year period, starting with a landscape assessment of existing patient interventions in community pharmacy and the development of interventions for the three priority disease states. Participating pharmacies selected one of the interventions (CVD, diabetes, and depression/anxiety) for delivery up to 12-months, following a 3-month planning period, with implementation guidance and coaching support from the project team. The initiative was evaluated based on mixed data collected to assess both implementation and intervention outcomes using an effectiveness-implementation hybrid Type II design. A hybrid Type II design is a research framework commonly used in implementation science that allows for simultaneous testing of both the implementation strategy and the effectiveness of that intervention.[21,22]

This article specifically focuses on summarizing the findings from the feasibility evaluation of the CVD and diabetes management (DM) S&R programs that were delivered in the community pharmacies selecting these programs as part of the CVCI. Feasibility is defined as the extent to which a particular intervention can be conveniently and successfully carried out in real-world settings.[23] The objective was to explore and evaluate implementation and program effectiveness for both S&R programs based on the mixed data obtained as part of the effectiveness-implementation hybrid Type II study. Gaining insights into the feasibility of implementing innovative patient care models in community pharmacy is critical to increasing access of healthcare services for patients in need within a value-based environment, thereby advancing population health.

2. Methods

2.1. Description of S&R CVD and DM programs

The CVD and DM interventions were developed using a systematic process grounded in Intervention Mapping.[24] Methods included an environmental scan of high priority issues and disease states that could be addressed in community pharmacy; a targeted literature search of the existing patient care interventions and best practices for the selected priority disease states (including critical program components); the development of a logic model and patient care process decision tree for each of the selected disease states based on expected outcomes; and the creation of user-friendly toolkits. Input from an advisory committee composed of pharmacists, physicians, and health plans representatives was incorporated throughout the identification and development of the CVD and diabetes interventions.

The toolkits provided an overview of each program, disease state, patient populations who would benefit, biometric health screening and risk assessment processes, patient care flow processes, treatment guidelines, and step-by-step care delivery support and instructions. Detailed information such as eligibility criteria for screening, patient care pathways based on screening results, and referral options were outlined in the toolkits. Each toolkit was supplemented with an abbreviated pharmacist and patient packet for ease of use. The toolkits also benefited from review by content experts and pilot tested by community pharmacy partners with at least 5 patients prior to full implementation.

The overall goal of the S&R programs was to increase access to care by identifying patients at risk for the disease state, screening those eligible patients, providing a brief consultation session, and coordinating care as appropriate. To be eligible for S&R, patients were required to be over the age of 18 and be able to understand English. Although anyone meeting these criteria could be screened, the recommended target populations for the CVD S&R program were those with a family history of CVD, smokers, and patients with diabetes, high blood pressure, or high cholesterol. CVD was defined as including coronary heart disease, peripheral artery disease, heart attack, and stroke. Ineligible participants were patients already receiving medication management or diagnosed with another form of CVD (e.g., heart failure). Likewise, patients most likely to benefit from the DM S&R were identified as those with a family history of diabetes, those currently diagnosed with type 2 diabetes or a previous history of gestational diabetes,

patients with polycystic ovarian syndrome, high blood pressure or a high cholesterol, and those overweight or physically inactive patients. Excluded were individuals already receiving diabetes medication management, or with type 1 diabetes.

Recommended pathways for identifying potentially eligible patients included: during medication pick up, through patient self-identification, and through physician referrals. However, the participating pharmacists further tailored these initial patient identification strategies based on their goal of enrolling patients in the full CVD and DM programs (e.g., pre-flagged patients based on medication history). Following confirmation of eligibility, patients in both programs completed the screening process. The CVD tests were based on collection and entry of blood pressure, blood glucose, cholesterol, and BMI and/or waist circumference values into the American College of Cardiology (ACC)/American Heart Association (AHA) atherosclerotic cardiovascular disease (ASCVD) Risk Estimator plus to estimate the 10-year CVD risk. The diabetes screening was based on blood glucose and/or A1c, blood pressure, and BMI and/or waist circumference values. For both programs, pharmacy teams obtained the patients' values through point-of-care testing at the pharmacy or from patients' other healthcare providers (through formal requests or EHR access). Following the screening, the pharmacist consulted with the patient to review their results and provide any relevant education.

For patients identified as moderate to high risk for CVD (10-year ASCVD risk score $>$ 10 %), a referral was made to either recommend medication initiation or coordinate care with the patient's current medical provider. Patients currently on or newly prescribed a CVD medication were offered the option to enroll into the full 6-session pharmacist-delivered program consisting of health education and medication management. A similar process was followed for patients screening at risk or diagnosed for diabetes. The pharmacist communicated the results to the patient's healthcare provider and offered the following options for referrals. For patients at risk for diabetes (i.e., A1C between 5.7 % - 6.4 %), the pharmacist shared information on the local diabetes prevention programs. For patients at risk for or diagnosed with diabetes (i.e., A1C between 6.4 and 7 %), the pharmacist referred to the local Diabetes Self-Management Education and Support (DSME) program. Patients diagnosed with diabetes Type II and on medication with an A1c of >7 % were eligible for enrollment into the full 6-session program consisting of health education and medication management.

2.2. Pharmacy recruitment and program implementation

2.2.1. Recruitment phase

A total of eight pharmacy organizations were identified specifically for recruitment in the CVD and DM arms of the CVCI initiative. The identification process (described elsewhere[52]) involved a search of potential candidates based on a set of pre-selected criteria (e.g., relevant state regulations). All eight were successfully contacted, with leadership agreeing to participate in initial interest meetings to learn more about the project. These early discussions also serve to verify "fit" or compatibility of the service with the pharmacy organization, using a selection checklist developed for this initiative.[25] As a result of these meetings, five enrolled and signed a commitment letter, describing the benefits of participation and project expectations. The other three declined for various reasons, including organizational changes, uncertainties around staffing, other priorities and responsibilities (e.g., COVID-19 vaccines), and payor constraints. Of the five participating pharmacy organizations, two were regional grocery chains and three were independent pharmacies in VA, NC, and PA, with total of 15 pharmacy sites initially enrolled in this project (Table 1). A stipend was offered to each organization to offset any administrative burden associated with participation.

Table 1
Characteristics of participating pharmacies.

Pharmacy ID	Program	Pharmacy Site	Unique Number of Patients Served (monthly average*)	Total Number of Pharmacists (FTEs)	Total Number of Pharmacists involved in program implementation	Pharmacy Location (urban vs rural)	Patient Identification Strategies
Organization 1	CVD	Site A	100.5	1	1	Rural	Self-Identified, Prescription History
		Site B	69.4	1	1	Rural	Self-Identified, Prescription History
Organization 2	CVD	Site C	652.4	4	1	Urban	Self-Identified, POC Testing, Prescription History
		Site D	366.7	2	2	Urban	Self-Identified, Prescription History
Organization 3	CVD	Site E	283.3	1.5	1	Urban	Prescription History
		Site F	405.8	2	1	Urban	Self-Identified
		Site G	268.3	2	2	Rural	Prescription History
		Site H	206.7	1	1	Rural	Prescription History
		Site I	290	1.5	1	Urban	Prescription History
Organization 4	Diabetes	Site J	907.3	4	1	Urban	Physician referral, Prescription History
Organization 5	Diabetes	Site K	3265	2	1	Urban	Self-Identified, POC Testing, Prescription History
		Site L	1402.8	2	2	Urban	Self-Identified, POC Testing, Prescription History
		Site M	2750	2	1	Urban	Self-Identified, POC Testing, Prescription History
		Site N	2932.3	2	2	Urban	Self-Identified, POC Testing, Prescription History
		Site O	1645.4	2	2	Urban	Self-Identified, POC Testing, Prescription History

* Based on Unique number of patients served Jan 1 2022 – Dec 31 2022.

2.2.2. Implementation phase

Implementation Blueprint and Strategies: The implementation process was guided a multi-faceted set of steps and strategies, designed to assist participating pharmacies with program planning and delivery. These implementation science-informed strategies were tailored to the community pharmacy setting, and translated into a user-friendly implementation blueprint or roadmap. Implementation blueprints are defined as a set of connected steps and strategies that, when taken together, form an organized approach to implementation.[26] The blueprint steps ranged from ensuring alignment of the intervention, to identifying champions, to assessing and building readiness for implementation, to implementing, monitoring, and improving program delivery, to sharing data and transitioning beyond the project. Each step was associated with a number of implementation strategies, classified into eight broad categories aligned with Waltz and colleagues' classification.[27] The categories included: evaluative and iterative strategies (e.g., collect, analyze, and review outcomes data); service integration and tailoring (e.g., development of a workflow); orientation and education (e.g., participate in kickoff webinars); patient and consumer engagement (e.g., develop patient flyers); implementation infrastructure (e.g., prepare data documentation systems); champions and stakeholder relationships (e.g., identify pharmacist leads); financial and transitioning strategies (e.g., identify viable reimbursement pathways); and implementation supports (e.g., access to coaches). The blueprint, implementation strategies, and associated tools and resources are described in detail elsewhere.[28]

Preparing for Implementation: Participating pharmacies were given three months to prepare for implementation, with guidance and support from coaches. The coaches included three project team members, all of whom were trained and provided with defined coaching goals, practices, and agendas for the planning phase. Coaches were responsible for guiding the sites through a structured readiness assessment and building process described in detail elsewhere.[29,53] They assisted the sites with problem-solving, shared needed information, resources, and updates, helped with completion of deliverables, and monitored progress. Briefly, the planning phase included a kickoff webinar and four coaching calls (with as needed communication in-between). The kickoff webinar was designed to orient sites to the initiative, introduce the interventions, review timelines and deliverables, initiate the planning phase, and introduce the coaches. The coaching calls were designed to facilitate a readiness assessment, discuss and address challenges, ensure proper training on the toolkits, review data capabilities, discuss patient engagement strategies, pilot and refine the S&R programs workflows, and review deliverables and timelines as necessary. A readiness checklist served as a guide to assess progress, with sites determined to be sufficiently prepared once they had reached 80 % completion on the readiness milestones.

Implementation: During the 12-month program delivery phase, pharmacists were asked to identify and recruit eligible patients for participation in the S&R programs based on the criteria outlined in the S&R CVD and DM toolkits. However, each pharmacy site was given the opportunity to further refine these criteria based on their respective patient care processes, capabilities, and patient populations. For example, some sites opted to focus their efforts on patients already on a CVD or DM medication and only offered the S&R programs to those patients. Once patients were deemed eligible for screening, pharmacists were responsible for contacting, scheduling, screening, educating, and referring patients as appropriate. Pharmacists provided data documentation to the project team (e.g., number of patients eligible) and participated in monthly coaching calls.

2.3. Study design and data collection

This exploratory feasibility evaluation was designed as an effectiveness-implementation hybrid Type II project using mixed data. Evaluating implementation feasibility of the CVD and DM S&R programs in community pharmacies (aim 1) involved the following indicators and data sources: (1) levels of program adoption, both by the pharmacies and by the patients, as evidenced by pharmacy dropout rates during implementation and patients' contact and screening rates; (2) implementation outcomes survey scores, measuring levels of program acceptability (including pharmacy and patient satisfaction), appropriateness, feasibility, and intent to sustain use; and (3) key insights about implementation strategies, gathered from the implementing pharmacists and pharmacy leadership through 17 interviews (with 15 implementing pharmacists and 5 pharmacy leadership representatives across all but one DM site). Fidelity checklists (adapted from a previous fidelity assessment) [26,30] were used to ensure adherence to the core components of the S&R programs and take corrective action as needed. Of note, the selection of implementation feasibility indicators was informed by Bowen and colleagues' work as well as by implementation science guidelines for feasibility studies.[31,32] To gain preliminary insights into the effectiveness of the CVD and DM S&R programs (aim 2), patient referral rates, physician follow-up communication rates, and pharmacists-reported perceived outcomes were collected through patient tracking logs, surveys, and interviews. Table 2 provides a detailed overview of the study methodology, including data types, indicators, data sources, respondent types, and timeline, aligned with each of the two aims. This project was deemed non-human subjects research by the UNC IRB, and participation in the surveys and interviews was not compensated.

2.4. Data analysis

2.4.1. Quantitative analysis

All administrative data, including pharmacy dropouts, patient contact rates (all contacted rate and successfully contact rates), and screening, referral, and physician communication rates, were descriptive. The patient contact, screening, and referral rates were computed as percentages. The rate of patients contacted was measured by dividing the number of patients contacted by the number of eligible patients. The rate of successful contact was calculated as a percentage of those the pharmacists spoke to about the screening program out of those contacted. The screening rate was the total number of patients screened over the total number of patients who had been successfully contacted. Referral rates were calculated as the total number of patients successfully referred divided by the total number eligible for a referral. And follow-up communication rates with PCPs was computed as the number of reported results to PCPs made by pharmacists over total patients at risk for the disease state.

The retrospective pre-post surveys, including the Implementation Outcomes (IOQ) measures assessing acceptability, appropriateness, and feasibility, and the Intent to Sustain scale, were analyzed using descriptive statistics and paired *t*-tests.[33,34] A retrospective pre-post survey method was used to control for response-shift bias.[35] Differences and trends across pharmacy organizations and pharmacy sites were explored based on mean scores. Similarly, means and standard deviations were reported for the satisfaction (patients and pharmacists, both leaders and front-line) and perceived benefits surveys collected at the end of the S&R programs implementation.[36] Eta square coefficients were used to estimate the strength of association between implementation feasibility indicators and network membership (i.e, CVD or DM), organization membership, and role type (i.e., site pharmacist or corporate/leadership).

2.4.2. Qualitative analysis

Thirty to forty-five minute semi-structured interviews were conducted with both front-line pharmacists involved in the local delivery of the S&R programs and pharmacy leadership from each organization after completion of the programs. The interviews were designed to gather pharmacist perceptions of implementation successes and challenges as well as key insights regarding the feasibility of implementing the S&R programs. The interview protocol also included a question

Table 2
Overview of study methodology.

Aim	Data Type	Indicators		Data Source	Respondents	Timeline
Aim 1 – Implementation Feasibility	Administrative Data	Adoption		Project Records (Pharmacy Participation) Patient Tracking Logs (contact and screening rates)	Project Team Pharmacies	As needed Monthly throughout implementation
	Surveys	Fidelity		Fidelity checklists (5 items for both CVD and DM; dichotomous "yes" or "no" answer)		
		Acceptability	Acceptability of Program (Pharmacist)	Adapted IOQ (7 retrospective pre-post items; 6-point scale, from "strongly disagree" to "strongly agree")[33]	Pharmacists (Store-level and Across Stores)	At end of implementation; retrospective pre-post
			Pharmacist Satisfaction	Pharmacist Satisfaction Survey (3 items; 6-point scale, from "strongly disagree" to "strongly agree")[36]	Pharmacists (Store-level and Across Stores)	At end of implementation
			Patient Satisfaction	Patient Satisfaction Survey (11 items; 5-point scale, from "strongly disagree" to "strongly agree", Cronbach's alpha = 0.97)	Patients	Following screening
		Appropriateness		Adapted IOQ (5 retrospective pre-post items; 5-point scale, from "Not at all" to "Extremely")	Pharmacists (Store-level and Across Stores)	At end of implementation; retrospective pre-post
		Feasibility		Adapted IOQ (8 retrospective pre-post items; 6-point scale, from "strongly disagree" to "strongly agree")	Pharmacists (Store-level and Across Stores)	At end of implementation; retrospective pre-post
		Intent to Sustain		Intent to Continue Use Items adapted from Behavioral Intent to Use Measure (3 retrospective pre-post items; 6-point scale, from "strongly disagree" to "strongly agree")[34]	Pharmacists (Store-level and Across Stores)	At end of implementation
	Interviews	Key insights-barriers, facilitators, and lessons learned		Interview Transcripts	Pharmacists (Store-level and Across Stores)	At end of implementation
Aim 2 -Effectiveness of S&R Program	Administrative Data	Referral rates and Physician follow-up communication rates		Patient Tracking Logs	Pharmacies	Monthly throughout implementation
	Surveys	Perceived benefits and results		Perceived Benefits Items Adapted from the Result Demonstrability Measure (4 items; 6-point scale, from "strongly disagree" to "strongly agree")[34]	Pharmacists (Store-level and Across Stores)	At end of implementation
	Interviews			Interview Transcripts	Pharmacists (Store-level and Across Stores)	At end of implementation

about any relevant results and/or perceived outcomes as a result of this initiative. With participant consent, all interviews were recorded and transcribed. The interview data was analyzed using thematic analysis.[37] The transcribed interviews were used to identify emerging themes and concepts across interviews. Following an initial read of the transcripts, codes were created, organized, and clustered into themes d by re-reading through all interview transcripts. A third read was then conducted to apply the codes and themes. A final read was performed to ensure quality and completion. The analysis was conducted by the second author and reviewed by the first author, with any discrepancies resolved through discussion between the two authors.

3. Results

3.1. Sample description

Of the 15 participating sites across the five pharmacy organizations, 9 delivered the CVD program and 6 the DM program. The majority were located in urban geographical areas, with 4 in rural localities. Sites served between 69 and 3265 unique patients on average per month (Table 1). Number of FTEs ranged from 1 to 4 per site, with 1 or 2 involved in the delivery of the program. Patient identification and recruitment strategies adopted by the pharmacies included physician referral, POC testing, patient self-identification, and pharmacist identification based on prescription history.

A total of 117 patients were screened across both programs, including 61 for CVD and 56 for DM. CVD participants were mostly male (56 %), non-Hispanic (100 %), and White (98.4 %) with a mean age of 54. They had a mean systolic blood pressure of 129 and diastolic blood pressure of 78, with 31 % having more than 3 comorbidities (Tables 3 and 5). The DM patients were mostly female (68 %) non-Hispanic (95 %), and White (55 %) with a mean age of 64. Their mean A1C was 8.3 and the majority were non-smokers (93 %) (Tables 3 and 5).

3.2. Implementation feasibility

3.2.1. Program adoption

Pharmacy sites dropout rates: Of the 15 sites initially enrolled, only two discontinued participation during the course of the S&R program, or a participation rate of 87 %. Of the two, one site (CVD site) was unable to screen or document due to other responsibilities and priorities. The other, a DM site, decided against participation following staffing constraints.

Patient contact and screening rates: Patient contact and screening rates for each of the three organizations participating in the CVD program are summarized in Table 4. Rates of patients contacted for all three organizations were similar, with an overall contact rate of 76 %. Although successful contact rates for Organizations 2 and 3 were similar, 90 % and 93 % respectively, Organization 1 was able to reach only 40 % of the contacted patients. Likewise, screening rates differed across organizations. Organization 1 screened 84 % of all potential participants who were successfully contacted for recruitment, Organization 3 screened 54 % and Organization 2 screened 13 %. The variability in contact and screening rates is likely due to different patient recruitment strategies, varied staffing structures, and expectations to screen and enroll 25 patients per organization into the full CVD and DM programs (divided across sites belonging to the same pharmacy organization). For instance, Organization 1 adopted a targeted recruitment approach. In addition to

Table 3
Patient demographics.

	CVD S&R Program				DM S&R Program		
	Org 1 (*N* = 16)	Org 2 (*N* = 24)	Org 3 (*N* = 21)	Total CVD (*N* = 61)	Org 4 (*N* = 29)	Org 5 (*N* = 27)	Total DM (*N* = 56)
Age at Screen							
Mean (SD)	66.3 (12.6)	37.4 (30)	63.0 (9.6)	53.9 (24.4)	69.6 (9.2)	57.1 (15.5)	63.7 (14.0)
Gender							
Female	11 (68.8 %)	13 (54.2 %)	03 (14.3 %)	27 (44.3 %)	23 (79.3 %)	14 (51.8 %)	38 (67.9 %)
Male	05 (31.3 %)	11 (45.8 %)	18 (85.7 %)	34 (55.7 %)	06 (20.7 %)	13 (48.1 %)	18 (32.1 %)
Race							
White	16 (100.0 %)	23 (95.8 %)	21 (100.0 %)	60 (98.4 %)	14 (48.3 %)	17 (63.0 %)	31 (55.4 %)
African American	00 (0.0 %)	01 (4.2 %)	00 (0.0 %)	01 (1.6 %)	15 (51.7 %)	4 (14.8 %)	19 (34.0 %)
Asian	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	3 (11.1 %)	3 (5.3 %)
Other	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	3 (11.1 %)	3 (5.3 %)
Ethnicity							
Non-Hispanic	16 (100.0 %)	24 (100.0 %)	21 (100.0 %)	61 (100.0 %)	29 (100.0 %)	24 (88.9 %)	53 (94.6 %)
Hispanic	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)	3 (11.1 %)	3 (5.3 %)
Current smoker							
Yes	02 (12.5 %)	00 (0.0 %)	09 (42.9 %)	11 (18.0 %)	3 (10.3 %)	1 (3.7 %)	4 (7.1 %)
No	12 (75.0 %)	23 (95.8 %)	12 (57.1 %)	47 (77.0 %)	26 (89.7 %)	26 (96.2 %)	52 (92.9 %)
Unknown	02 (12.5 %)	01 (4.2 %)	00 (0.0 %)	03 (4.9 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)
Patient has more than 3 diagnoses							
Yes	09 (56.3 %)	04 (16.7 %)	06 (28.6 %)	19 (31.1 %)	17 (58.6 %)	1 (3.7 %)	18 (32.1 %)
No	05 (31.3 %)	20 (83.3 %)	15 (71.4 %)	40 (65.6 %)	12 (41.4 %)	26 (96.2 %)	38 (67.9 %)
Unknown	02 (12.5 %)	00 (0.0 %)	00 (0.0 %)	02 (3.3 %)	00 (0.0 %)	00 (0.0 %)	00 (0.0 %)

Abbreviations: Org = pharmacy organization; CVD = cardiovascular disease; DM = diabetes mellitus.

allowing walk-ins, the pharmacy team called patients they knew were eligible and screened them during these calls, resulting in higher screening rates. Site A stopped contacting patients once they reached their target number, while Site B joined the study late following the pharmacist's return after a temporary leave of absence, potentially explaining the low numbers at that site. Organization 2 recruited patients by having pharmacy residents call eligible customers. While they reached out to patients successfully, the lower screening rate may reflect both the challenges associated with patients having to schedule a follow-up screening session (rather than being screened on the phone directly) and perhaps the lack of a relationship with rotating 1-year pharmacy residents.

Likewise, the two DM organizations contacted 65 % of eligible patients, and were able to speak to 61 % of those contacted (Table 4). Of those successfully contacted, Organization 4 screened 78 %, while Organization 5 screened 14 %. Of note, Organization 4, an independent pharmacy, partnered with local endocrinology providers to recruit patients with high A1C values. While they contacted fewer patients they knew were eligible based on their focused recruitment strategy (lower contacted rate), these patients were more willing to speak with the pharmacist (high successful contact rate) and be screened (high screening rate). Organization 5, a regional grocery chain pharmacy, opened recruitment to all customers by offering A1C testing at their local pharmacies to eligible walk-ins and calling patients already on a diabetes medication. While their contact rate was higher with more eligible patients contacted, their successful contact rate and screening rates were comparatively lower than Organization 4, with fewer patients being successfully reached and agreeing to be screened.

3.2.2. *Acceptability, appropriateness, feasibility, and intent to sustain use*

Based on survey results averaged across CVD and DM networks, pharmacists (N = 17, M = 4.43, SD = 1.07, 6-point Likert scale) and patients (N = 99, M = 4.73, SD = 0.43, 5-point Likert scale) reported being highly satisfied with the programs. Pharmacists also agreed that the S&R programs were acceptable, compatible with pharmacy mission, patient population, approach to patient care, and workflow, and feasible to implement (Tables 6 and 7). There were no significant changes from pre- to post- for acceptability ($t(16) = 1.26, p > .05$) and appropriateness ($t(16) = 0.92$, $p > .05$). However, although remaining positive, feasibility perceptions significantly decreased over time ($t(16) = 2.73, p < .05$). Closer examination of the scores by CVD and DM networks revealed that the significant change in feasibility scores may be due to CVD respondents only ($t(8) = 2.27, p = .05$). There were no significant differences in pre- and post- feasibility scores for DM respondents ($t(7) = 1.51$, $p > .05$). In other words, survey participants implementing the CVD S&R program reported significantly lower feasibility post-implementation. Regardless, perceptions of acceptability, compatibility, and feasibility remained high throughout implementation.

When asked whether they would continue delivering the programs past the project period, respondents were significantly more likely to agree prior to the implementation period compared to after implementation ($t(17) = 3.47, p < .05$). When averaged across networks, post-implementation scores did not reflect intent to sustain the programs long-term. Similarly to the pattern that emerged for feasibility, *t*-tests revealed that the significant decrease was due to respondents in the CVD network ($t(8) = 3.51$, $p < .05$), not the DM network($t(7) = 1.46$, $p > .05$). Regardless, unlike perceptions of acceptability, compatibility, and feasibility, intent to sustain were negative for both networks following the implementation period. Based on the post-implementation means for intent to sustain use at the site level (Tables 6 and 7), only three (1 DM, and 2 CVD) out of the 11 pharmacy sites represented in the survey, or 27 %, were interested in continuing the programs.

Of note, based on the eta squared, associations between the four implementation indicators and each of the tested variables were as follows: no association with network (except for intent to sustain, $\eta^2 = 0.14$); a strong association with organization membership (with η^2 ranging from 0.28 to 0.62); and small associations with role type (ie., front line pharmacist vs pharmacy leadership) only for feasibility ($\eta^2 = 0.05$) and intent to sustain ($\eta^2 = 0.03$). In other words, whether pharmacists implemented the CVD or DM S&R program influenced responses on likelihood of sustainability. The organization the respondents belonged to was strongly associated with perceptions of acceptability, appropriateness, compatibility, and intent to sustain. Despite pharmacy leadership scoring consistently higher than front line pharmacists on all feasibility indicators (but post-appropriateness scores) (Table 8), this relationship was not significant based on eta squared.

3.2.3. *Implementation strategies: Facilitators, barriers, and insights*

Results clustered into facilitators, barriers, and insights associated with patient engagement, relationships with other healthcare

Table 4
Patient successful contact and screening rates.

Pharmacy Organization	Sites	Contacted Rate (Total Contacted/ Total Eligible)	Successful Contact Rate (Total Successfully Contacted/Total Contacted)	Screening Rate (Total Screens/ Total Successfully Contacted)
CVD S&R Program				
Organization 1	Site A	77.8 % (42/ 54)	38.1 % (16/42)	81.3 % (13/16)
	Site B	5/Unknown (not included in total)	60 % (3/5)	100 % (3/3)
Organization 1 Total		***77.8 % (42/ 54)***	***40.4.% (19/47)***	***84.2 % (16/ 19)***
Organization 2	Site C	68.2 % (116/ 170)	81.9 % (95/116)	14.7 % (14/95)
	Site D	83.8 % (88/ 105)	100 % (88/88)	11.4 % (10/88)
Organization 2 Total		***74.2 % (204/ 275)***	***89.7 % (183/ 204)***	***13.1 % (24/ 183)***
Organization 3	Site E	34.8 % (8/23)	100 % (8/8)	87.5 % (7/8)
	Site F	100 % (1/1)	100 % (1/1)	100 % (1/1)
	Site G	100 % (12/12)	75 % (9/12)	77.8 % (7/9)
	Site H	100 % (21/21)	100 % (21/21)	28.6 % (6/21)
Organization 3 Total		***73.7 % (42/ 57)***	***92.9 % (39/42)***	***53.8 % (21/ 39)***
CVD TOTAL		**75.9 % (293/ 386)**	**82.3 % (241/ 293)**	**25.3 % (61/ 241)**
DM S&R Program				
Organization 4	Site J	42.9 % (45/ 105)	82.2 % (37/45)	78.4 % (29/37)
Organization 4 Total		***42.9 % (45/ 105)***	***82.2 % (37/45)***	***78.4 % (29/ 37)***
Organization 5	Site K	72.3 % (112/ 155)	56.3 % (63/112)	7.9 % (5/63)
	Site L	100 % (50/50)	58 % (29/50)	34.5 % (10/29)
	Site M	66.7 % (52/ 78)	57.7 % (30/52)	3.3 % (1/30)
	Site N	50.7 % (74/ 146)	52.7 % (39/74)	25.6 % (10/39)
	Site O	86.9 % (53/ 61)	71.7 % (38/53)	2.6 % (1/38)
Organization 5 Total		***69.6 % (341/ 490)***	***58.4 % (199/ 341)***	***13.6 % (27/ 199)***
DM TOTAL		**64.9 % (386/ 595)**	**61.1 % (236/ 386)**	**23.7 % (56/ 236)**

professionals, and service integration strategies. Related to patient engagement, pharmacists mentioned that having a previously established relationship or rapport with patients was a key facilitator to engaging them with the S&R programs. Having a strong rapport with patients allowed for conversations about the programs and facilitated additional needed follow-ups (e.g., "So I think, in the smaller towns with less providers and then only maybe one or 2 pharmacies, it worked out a little bit better. Those relationships started and kept the follow-ups coming as well.")

Having a more targeted approach to identifying patients was also reported as helpful for successful recruitment. Some pharmacists reported having a difficult time finding eligible patients due to the stringent eligibility criteria (e.g., "…Then actually having the patient qualify [was hard] because we had 2 or 3 patients that we thought 'oh, they definitely qualify', and then they didn't, and we were just kind of shocked by that."). Pharmacy locations that ran reports and contacted patients based on current prescribed medications or readily available lab values saved time by identifying eligible patients prior to reaching out (e.g., "It worked a lot. We got people a lot faster once we really kind of drilled down to who would likely qualify based on our knowledge of their past medical history.").

Finally, one challenge to engaging patients was low motivation and/ or complacency with the disease state (e.g., "If they've had [disease state] for a long time they're just not motivated or willing to do something out of the blue, even though their [clinical value] is high. They are not managing things, whatever it is, it's been going on and on. A lot of people are like 'alright, I've had diabetes for 30 years, so I don't need to know anything else about it.'"). Interviewees identified two strategies they used to overcome this challenge: tailoring messages and "elevator pitches" about the program and providing the patient with physical copies of the information related to the program (e.g., "I guess that how you portray the program to the patient plays a big role. If it comes off as 'well this seems like this is going to be a lot of work or really not worth it,' then you're probably not going to get as many people. It plays a big factor.")

Program implementation was reported to be facilitated by existing relationships with primary care providers and other health professionals. Interview participants identified the lack of responsiveness from physicians as a significant barrier to patient recruitment, mainly due to the need to obtain clinical values for screening and assessment. Even with a signed release of information form from the patient, pharmacists' requests for lab values were oftentimes ignored or rejected (e.g., "They [the provider] still won't give me anything…. I have signed release of information from patients, and the doctors will not give me the information… I said that this is a study the patient has signed up for that they want to be enrolled in. I have signed documentation from your facility for what is exactly supposed to be signed, please. We are providers, there's not like a HIPAA issue there, or anything like that.") Having access to electronic medical records bypassed the need to obtain values from the medical providers, thereby facilitating program delivery.

Finally, previous experience with providing patient care services (e.g., "I think our pharmacies have had a lot of experience with [engaging patients in clinical] services over the years. And so with that I don't think it was as hard to convince people… I thought that that part was good, because the premises were able to at least take what materials were given to them and share the value with the patients and get their buy-in .") and alignment with current priorities influenced service uptake. Concerns raised by the interviewees included a continued focus on dispensing, staffing challenges, and volume related to existing vaccination programs (e.g., "We're just too busy. I mean, I hate to say that… but like in reality, we're just doing a lot of counting pills, and I mean giving Covid shots and giving regular shots. You know our hours are 9 to 9. I sometimes I come in at 7, 730, and until 1130 at night. I mean that's just to get the bare minimum done."). A suggested strategy to address these barriers was the hiring of a devoted staff member for clinical management and/or outreach (e.g., "If there was a dedicated person, a resident, a student and intern, somebody who could just go from pharmacy to pharmacy… that's all they do. They're not answering the phone. They're not giving shots. They're not filling prescriptions. They're just dedicated to clinical management essentially, and they could just put their all into it. I mean, I think that would have been more successful, but trying to add this on top of everything else in the day, you can't do it.").

3.3. Preliminary program effectiveness

3.3.1. Patient referral and physician follow-up communication rates

For CVD, 79 % of patients screened were at moderate or high risk of CVD (Table 5). All at-risk participants (100 %) were referred to the Comprehensive CVD Full Program offered as part of this initiative at the pharmacy site (Table 9). Screening results for 65 % of at-risk participants were communicated to their primary care provider (Table 9). Since the majority of sites identified patients based on past medical

Table 5
Patient clinical description and risk classification.

CVD S&R Program	Organization 1 (N = 16)	Organization 2 (*N* = 24)	Organization 3 (*N* = 21)	Total CVD (*N* = 61)
At-Risk Rate				
Total positive screens/ Total Screens	87.5 % (14/16)	83.3 % (20/24)	66.7 % (14/21)	78.7 % (48/61)
Patient currently on CVD medication				
Yes	14 (87.5 %)	22 (91.7 %)	18 (85.7 %)	54 (88.5 %)
No	0 (0.0 %)	0 (0.0 %)	2 (9.5 %)	2 (3.3 %)
Unknown	02 (12.5 %)	2 (8.3 %)	1 (4.8 %)	5 (8.2 %)
CVD Risk Categorization				
PMH of CVD OR Moderate (10 %–20 %) to High Risk (>20 %)	014 (87.5 %)	020 (83.3 %)	014 (66.7 %)	48 (78.7 %)
Low-Risk (<10 %)	2 (12.5 %)	4 (16.7 %)	7 (33.3 %)	13 (21.3 %)
Systolic Blood Pressure (mmHg)				
Mean (SD)	127.9 (15.5)	126.9 (9.5)	132.3 (17.4)	128.8 (14.0)
N (N Missing)	16 (0)	23 (1)	17 (4)	56 (5)
Diastolic Blood Pressure (mmHg)				
Mean (SD)	76.7 (11.6)	72.6 (6.1)	77.9 (12.1)	75.4 (10.0)
N (N Missing)	16 (0)	23 (1)	17 (4)	56 (5)
HDL Cholesterol (mg/DL)				
Mean (SD)	47.8 (14.8)	50.4 (13.3)	41.3 (14.5)	46.9 (14.3)
N (N Missing)	16 (0)	22 (2)	16 (5)	54 (7)
LDL Cholesterol (mg/DL)				
Mean (SD)	100.5 (38.4)	94.1 (31.8)	85.6 (42.8)	93.6 (36.9)
N (N Missing)	16 (0)	22 (2)	15 (6)	53 (8)
DM S&R Program	***Organization 4 (N = 29)***	***Organization 5 (N = 27)***		***Total DM (N = 56)***
At-Risk Rate				
Total positive screens (A1c > 7)/ Total Screens	96.6 % (28/29)	29.6 % (8/27)		64.3 % (36/56)
Patient currently on diabetes medication				
Yes	28 (96.6 %)	18 (66.7 %)		46 (82.1 %)
No	01 (3.4 %)	07 (25.9 %)		08 (14.3 %)
Unknown	00 (0.0 %)	02 (7.4 %)		02 (3.6 %)
Diabetes classification using A1C				
Uncontrolled diabetes (≥ 8 %)	27 (93.1 %)	05 (18.5 %)		32 (57.1 %)
Controlled diabetes (6.5–7.9 %)	02 (6.9 %)	4 (14.8 %)		06 (10.7 %)
Pre-Diabetes (5.7–6.4 %)	00 (0.0 %)	06 (22.2 %)		06 (10.7 %)
Normal-(<5.7 %)	00 (0.0 %)	11 (40.7 %)		11 (19.6 %)
Unknown	00 (0.0 %)	01 (3.7 %)		01 (1.7 %)
A1c Value				
Mean (SD)	9.8 (1.7)	6.5 (1.4)		8.3 (2.2)
N (N Missing)	29 (0)	25 (1)		54 (1)

Abbreviations: CVD = cardiovascular disease; DM = diabetes mellitus; PMH=Patient medical history; HDL = High Density Lipoproteins; LDL = Low Density Lipoproteins.

history and existing lab values (Tables 1 and 5), it is possible that pharmacists assumed the patient's medical provider was already aware of their lab values and diagnosis with no need to communicate additional screening results. Additionally, sites with higher physician follow-up communication rates were either partnered with a clinic (e.g., Site E) or already had touchpoints with medical providers through other programs they were offering (e.g., Site A).

Based on the DM S&R program screening results, 57 % of patients had uncontrolled diabetes, 11 % had controlled diabetes, 11 % had prediabetes, and 20 % were normal (Table 5). At-risk participants (100 %) across all sites were referred to the appropriate program based on their diabetes status (Table 10). Namely, 74 % were referred to the Comprehensive DM Full program implemented by the pharmacies as part of this project, 14 % to a Diabetes Prevention Program (DPP), and 9 % to the Diabetes Self-Management Education and Support (DSME) program. The screening result for 66 % of the participants was communicated to their primary care provider. However, site-level communication rates revealed that Organization 4 shared the screening results with the patient's physician 100 % of the time, while Organization 5 did not communicate any patient data with other healthcare professionals. Again, Organization 4 relied on a network of endocrinology providers to recruit patients with high A1C values, and had access to electronic medical records, therefore facilitating close communication between pharmacists and physicians. Organization 5 offered A1C testing at their local pharmacies with no access to electronic medical records.

3.3.2. Perceived program outcomes

Based on the survey scores (Tables 6, 7, and 8), respondents across sites, organizations, and networks all agreed that the S&R programs were beneficial and impactful. Interestingly, there were strong associations between perceived benefits scores and both network ($\eta^2 = 0.27$) and organization ($\eta^2 = 0.61$) membership. CVD network respondents' scores trended higher on perceived benefits compared to DM network respondents. Likewise, scores were highly dependent on the pharmacy organization of the respondent. Potential explanations include: lack of buy-in from frontline pharmacists belonging to Organization 5 (DM) due to the decision from the organization leadership that all trainings, communication, and coaching follow a train-the-trainer model, with no direct relationship between project team and front-line pharmacists; positive experiences with previous initiatives focused on direct patient care services (all organizations but Organization 5); and frustration related to successfully contacting patients known to be eligible for the program (Organization 4 (DM) mentioned challenges related to having patients answer the phone or call back). On average, front line pharmacists scored higher on perceived benefits than pharmacy leadership, although the strength of the association was small ($\eta^2 = 0.06$). Patient impact is likely more directly observed by those interacting directly with patients than management.

Based on the interviews, perceived benefits of the S&R programs included: increased knowledge and motivation for the participating pharmacists, enhanced relationships with patients, and a positive impact on patients' health. First, pharmacists believed that providing this additional line of care to their patients not only increased their

Table 6
CVD S&R Program: Feasibility indicator scores.

Site/Organization		Acceptability		Appropriateness		Feasibility		Intent to Sustain		Perceived Benefits
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Site A (N = 2)	Mean	4.79	5.07	3.60	3.80	4.38	4.44	4.50	4.50	4.88
	Std	0.56	0.26	0.66	0.75	0.48	0.50	0.50	0.50	0.33
Organization 1 Average (N = 2)	Mean	4.79	5.07	3.60	3.80	4.38	4.44	4.50	4.50	4.88
	Std	0.56	0.26	0.66	0.75	0.48	0.50	0.50	0.50	0.33
Site C (N = 1)	Mean	5.14	4.86	4.20	4.40	4.88	4.88	4.00	4.00	6.00
	Std	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site D (N = 2)	Mean	5.07	4.93	3.60	3.80	4.00	4.00	4.33	3.00	6.00
	Std	0.59	0.70	0.92	0.87	1.41	1.41	0.47	1.00	0.00
Organization 2 Average (N = 2)	Mean	5.07	4.93	3.60	3.80	4.00	4.00	4.33	3.00	6.00
	Std	0.59	0.70	0.92	0.87	1.41	1.41	0.47	1.00	0.00
Site E (N = 2)	Mean	5.00	4.50	3.40	3.30	4.19	3.19	4.00	2.17	4.88
	Std	0.53	0.63	0.66	0.78	0.88	1.42	0.00	0.37	0.33
Site G (N = 2)	Mean	4.21	3.86	2.90	2.60	4.00	2.94	4.50	2.67	4.50
	Std	1.52	1.36	0.70	0.92	1.00	1.56	0.50	0.47	0.50
Site H (N = 2)	Mean	4.79	4.57	3.60	3.60	4.31	3.94	3.50	2.17	4.88
	Std	0.77	0.62	0.66	0.80	0.98	1.25	0.50	0.37	0.33
Site I (N = 2)	Mean	4.29	2.93	3.30	3.20	4.19	2.94	4.00	1.67	5.00
	Std	1.10	1.67	0.64	0.98	0.95	1.60	0.00	0.75	0.50
Organization 3 Average (N = 5)	Mean	4.23	3.69	3.24	3.16	4.05	3.03	4.00	2.07	4.85
	Std	1.17	1.53	0.81	1.05	0.84	1.49	0.63	0.68	0.48
CVD AVERAGE (N = 9)	Mean	4.54	4.27	3.40	3.44	4.11	3.56	4.19	2.81	5.11
	Std	1.02	1.36	0.83	1.00	0.95	1.45	0.61	1.22	0.61

Table 7
DM S&R Program: Feasibility indicator scores.

Site/Organization		Acceptability		Appropriateness		Feasibility		Intent to Sustain		Perceived Benefits
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Site J (N = 2)	Mean	4.43	4.93	3.60	3.70	4.19	4.00	4.00	4.67	4.63
	Std	0.62	0.46	0.66	0.46	1.13	0.87	0.82	0.47	0.48
Organization 4 Average (N = 2)	Mean	4.43	4.93	3.60	3.70	4.19	4.00	4.00	4.67	4.63
	Std	0.62	0.46	0.66	0.46	1.13	0.87	0.82	0.47	0.48
Site K (*N* = 3)	Mean	4.86	4.24	3.73	3.27	4.21	3.75	4.22	3.22	4.67
	Std	0.64	1.23	0.68	0.85	0.76	1.05	0.63	0.92	0.47
Site L (*N* = 4)	Mean	4.36	3.75	3.30	2.85	3.97	3.44	4.25	3.17	4.25
	Std	0.72	1.09	0.71	0.79	1.13	1.37	0.83	0.80	0.66
Site N (N = 3)	Mean	4.76	4.14	3.73	3.27	4.46	4.13	4.33	3.33	4.58
	Std	0.53	1.12	0.44	0.68	0.71	1.05	0.47	0.94	0.49
Organization 5 Average (N = 6)	Mean	4.52	4.12	3.40	3.10	3.94	3.65	4.11	3.39	4.46
	Std	0.79	1.14	0.76	0.87	1.07	1.25	0.74	0.76	0.64
DM AVERAGE (*N* = 8)	Mean	4.50	4.32	3.45	3.25	4.00	3.73	4.08	3.63	4.50
	Std	0.76	1.07	0.74	0.83	1.09	1.18	0.76	0.81	0.61

Table 8
Feasibility indicator scores by role.

What is your role in the pharmacy?		Acceptability		Appropriateness		Feasibility		Intent to Sustain		Perceived Benefits
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Store-Level Pharmacists (*N* = 12)	Mean	4.42	4.21	3.33	3.37	3.90	3.52	4.08	3.08	4.92
	Std	0.98	1.30	0.85	1.00	1.06	1.40	0.68	1.09	0.73
Leadership (across multiple sites) (N = 5)	Mean	4.77	4.49	3.64	3.32	4.45	3.93	4.27	3.47	4.60
	Std	0.64	1.02	0.56	0.73	0.80	1.10	0.68	1.15	0.49

knowledge, but also their motivation to practice at the top of their license (e.g., "So I mean it did actually force me in a good way to do some reading up about diabetes, education, and like brush up on the drugs, and what the mechanisms of actions are… It made me feel like, 'yeah, I can do more than just count pills'").

The opportunity to further build relationships and trust with patients through delivery of quality services and continued engagement was another benefit of participation reported by the interviewees (e.g., "… and be that involved from a patient standpoint, I think that we have a different sort of relationship with the patients than they might have with their doctor's office, and they have more access to us. So I think that it's a great potential, and it's been like really great and building our relationships gives them another resource to use.").

Finally, pharmacists highlighted patient impact as a perceived outcome of the S&R programs. As a result of the program, they noted positive changes in the patients, related to both medication management and healthy behaviors (e.g., "When we were doing the screening process, he realized that he had high blood pressure that was not being adequately addressed. He went and reached out to his provider about that just based on the blood pressure we had at the initial screening and started to get that process resolved for him.").

Table 9
CVD S&R Referral status and communication status by site.

Site Name	**Referral Rate** (Total Referred to CVD Full Program/Total eligible for referral)	**Physician Follow-up Communication Rate** (Results communicated to PCP/Total at-risk)
Site A (Organization 1)	100 % (13/13)	100 % (13/13)
Site C (Organization 2)	100 % (10/10)	20 % (2/10)
Site D (Organization 2)	100 % (10/10)	100 % (10/10)
Site E (Organization 3)	100 % (7/7)	85.7 % (6/7)
Site F (Organization 3)	100 % (1/1)	0 % (0/1)
Site G (Organization 3)	100 % (5/5)	0 % (0/5)
Site H (Organization 3)	100 % (2/2)	0 % (0/2)
CVD TOTAL	100 % (48/48)	64.6 % (31/48)

Abbreviations: **CVD** Full Program = Comprehensive **Cardiovascular** Full Program; PCP=Primary care provider.

4. Discussion

Heart disease and diabetes can be effectively managed with timely screening, referrals, and education. However, an already overburdened healthcare system and the lack of convenient and flexible options to access needed care negatively impact population health. Community pharmacists may be well positioned to facilitate heart disease and diabetes screenings, refer patients who may otherwise not get screened, and provide needed education. The purpose of this study was to explore and evaluate the feasibility of implementing CVD and a DM S&R Programs in community pharmacies and collect preliminary program effectiveness data using an effectiveness-implementation hybrid Type II design. The perceived benefits of offering these types of programs were evident based on preliminary data. A number of key insights related to both patient and pharmacist uptake (short- and long-term) emerged from this study, with implications for the importance of relationship building, and a continued emphasis on the need for a macro-level redesign of community pharmacy sustainability models.

Based on levels of program adoption, pharmacist and patient satisfaction, and pharmacists' positive perceptions of acceptability, compatibility, and feasibility, the two S&R programs were well-received by pharmacists and patients, aligned with the care practices and culture at the pharmacy sites, and could be feasibly delivered within the pharmacies. Pharmacists were also able to refer patients appropriately based on the screening results and clearly identified the perceived outcomes of these programs, namely increased confidence in their ability to practice at the top of their license, an enhanced relationship with patients, and perceived health benefits for the patients. Previous research on CVD and DM programs and other brief interventions, has supported the feasibility and benefits of delivering this type of patient care service in a U.S. community pharmacy setting.[38–40]

Based on the contact and screening rates, which are aligned with current literature, patient uptake seemed to be influenced by endorsement of the service by their medical provider.[41] For instance, patients eligible for the DM S&R program were particularly receptive if their doctor referred them and supported their participation. These findings align with previous research identifying low awareness of the types of patient care services offered by community pharmacists, lack of a relationship with the pharmacist, and low expectations in the pharmacist's knowledge and skills in complimentary medicine, as barriers to a patient's willingness to engage with community pharmacy expanded services.[40,42,43]

Similarly, pharmacist uptake seemed to be impacted by several facilitators and barriers. The importance of the pharmacist's interpersonal skills and relationship with the patient, the need to customize introduction of the new services to each patient to overcome disease complacency, and an emphasis on personalizing patient recruitment strategies have been identified in the literature as facilitators of patient engagement.[40,44–46] Similarly, engagement with other healthcare providers (whether through personal relationships or access to electronic medical records) appeared critical for community pharmacists to be able to successfully integrate the programs (impacting both effective patient recruitment and communication rates with medical providers). Previous research has repeatedly cited the importance of medical provider referrals, pre-existing or establishing relationships with medical providers, and positive communication and collaboration with other healthcare professionals as key to implementation.[40] Some healthcare professionals are still learning about the community pharmacists' clinical expertise and ability to provide care beyond dispensing medications, and may benefit from a visit from their local community pharmacist.[40,47]

Given the importance of relationships, whether between the patient and the pharmacist, or the pharmacist and the patient's doctor, community pharmacists interested in providing innovative patient care programs may need to carefully consider strategies to engage both patients and the patient's medical community. Banners, displays, flyers, local publicity, media campaigns may help raise the public's awareness of the services, while dedicating time and effort to building a rapport

Table 10
DM S&R Program: Referral status and communication status by site.

Site Name	**Referral Rate** (Total patients successfully referred/Total eligible for referral)	**Referred to DM Full Program**	**Referred to DPP**	**Referred to DSME**	**Physician Follow-up Communication Rate** (Results communicated to PCP/ Total at-risk)
Site J (Organization 4)	100 % (29/29)	28 (96.6 %)	0 (0 %)	1 (3.4 %)	100 % (29/29)
Site K (Organization 5)	100 % (5/5)	3 (60 %)	1 (20 %)	1 (20 %)	0 % (0/5)
Site L (Organization 5)	100 % (7/7)	2 (28.6 %)	4 (57.1 %)	1 (14.3 %)	0 % (0/7)
Site M (Organization 5)	100 % (1/1)	1 (100 %)	0 (0 %)	0 (0 %)	0 % (0/1)
Site N (Organization 5)	100 % (1/1)	0 (0 %)	1 (100 %)	0 (0 %)	0 % (0/1)
Site O (Organization 5)	100 % (1/1)	0 (0 %)	0 (0 %)	1 (100 %)	0 % (0/1)
DM TOTAL	100 % (44/44)	34 (77.3 %)	6 (13.6 %)	4 (9.1 %)	65.9 % (29/44)

Abbreviations: DM Full Program = Comprehensive Diabetes Full Program; DPP=Diabetes Prevention Program; DSME = Diabetes Self-Management Education and Support; PCP=Primary care provider.

with the pharmacy clientele may enhance patient engagement with the services.[40] Likewise, strategies to facilitate the building of relationships with medical providers may include intentional outreach to medical providers, carefully crafted messaging and patient testimonials, and a focus on the patient's health. Models, such as the LINKAGE framework, can help create lasting connections between community pharmacists and physicians.[48]

Despite perceived feasibility of providing CVD and DM S&R services especially in a mature relational context, pharmacists also highlighted a number of concerns, which may have impacted their intent to continue delivery of the programs past this project. Staffing challenges (e.g., burnout), increased workload, lack of time, and competing priorities have all been previously identified as significant barriers to successful integration.[40] These conditions seem to be hallmarks of the traditional high-volume fast-paced retail pharmacy settings.[49] Transitioning to a value-based (or outcomes-based) care model focused on patient care and population health may require a macro-level redesign of community pharmacy models.

According to Schommer and his colleagues, this redesign must involve advancements in pharmacy technician practice, expansion of pharmacy residency programs, "seeing transformations through the patient's eyes," and the creation of appropriate sustainability models.[50] Specific recommendations included broadening the ability of pharmacists to delegate tasks to technicians to optimize a division of labor better aligned with areas of expertise; developing comprehensive residency program that build capacity in clinical skills, patient care models, health informatics, performance systems, and integration processes within emerging systems of care; and a greater focus on understanding patients' wants and needs. Finally, for this transformation to be sustainable, reward and reimbursement systems need to be modified to focus on patient outcomes and patient care revenue rather than product inventory and number of prescriptions filled.[40,51] As long as current payment methods are misaligned, efforts by community pharmacies to effectively and efficiently manage population health will not be broadly implemented. Although emerging models of care delivery are emerging, additional research needs to be done to identify the most successful and scalable approaches.

4.1. Strengths and limitations

The strengths of this study include use of a robust design and methodology that allowed for simultaneous exploration of implementation and intervention outcomes; use of mixed data, with the qualitative data being used to both deepen and add to quantitative findings; and use of an implementation blueprint or roadmap (with specific implementation strategies) that guided the participating pharmacies and coaches through the process of delivering the intervention. Although this study contributes important insights into the implementation of CVD and DM S&R programs in community pharmacy, it also has some limitations. First, the sample size of represented pharmacy organizations is small, although attempts were made to diversify types of organizations (e.g., chain, independent) to increase generalizability. Second, the initiative occurred during and shortly after the COVID-19 pandemic, which may have impacted findings, although consistency with previous research does add to the credibility of the results. Third, although referral and physician follow-up communication rates are appropriate preliminary indicators of effectiveness, future research should include additional outcomes, such as patient-reported outcomes (other than satisfaction) and patient follow-up on the pharmacist-recommended course of action, to strengthen evidence of program effectiveness.

5. Conclusion

In conclusion, community pharmacies can improve access to care and advance population health by providing screening and referral CVD and DM patient care programs to patients in need. However, success with broader implementation will require a paradigm shift with a more intentional integration of community pharmacists as valued members of the medical community, a focus on expanding community pharmacies' relational footprints, and a potential re-design of community pharmacy sustainability models.

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CRediT authorship contribution statement

Melanie Livet: Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization, Writing – review & editing, Writing – original draft. **Amber Watson:** Formal analysis, Data curation, Writing – original draft. **Shweta Pathak:** Formal analysis, Data curation. **Courtney Humphries:** Project administration. **Jessica Roller:** Project administration. **Jon Easter:** Project administration, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Melanie Livet reports financial support was provided by the National Association of Chain Drug Stores (NACDS) Foundation. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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