

The Impact of Wearable Health Technologies on Patient Monitoring and Disease Management

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Abstract

Background: Milwaukee, Wisconsin continues to face notable gaps in health outcomes, particularly among residents in communities with limited resources. These groups experience disproportionately high rates of cardiovascular illness, metabolic disorders, and related risk factors. Pharmacists, with their training in clinical assessment, point-of-care testing, and patient counseling, are well positioned to help reduce these disparities. This project sought to design a pharmacist-directed health assessment initiative rooted in community partnerships to better support populations facing barriers to care.

Methods: Using a community-engaged research framework, partnerships were formed with neighborhood organizations and residents to identify the chronic conditions of greatest concern. From these discussions, a set of health screenings and preventive services was created to align with the priorities identified by the community. Pilot sessions were conducted to refine workflow, validate processes, and prepare faculty and student pharmacists for consistent delivery of the services.

Results: Sustained relationships were established with long-standing community service groups, enabling resource-sharing and expanded outreach. A point-of-care screening model for conditions such as hypertension, obesity, diabetes, and elevated cholesterol was introduced and implemented within the selected neighborhoods. The program continues to operate with ongoing involvement from pharmacists and student pharmacists affiliated with the School of Pharmacy.

Conclusion: Through collaborative, community-driven research efforts, a pharmacist-led health screening program was successfully developed and integrated into an underserved urban area. This article outlines the approach used to design, refine, and implement the initiative, which aims to mitigate health inequities and improve access to preventive care.

KEYWORDS: Community-driven health assessments; Participatory engagement; Program development; Service implementation; Social and economic health factors; Vulnerable communities; Access to preventive care.

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ABBREVIATIONS

CVD – Cardiovascular Disease, SDOH – Social Determinants of Health, HRSA – Health Resources & Services Administration, SES –

Socioeconomic Status, MCWSOP – Medical College of Wisconsin, School of Pharmacy, IRB – Institutional Review Board, NDF – Next Door Foundation, IPPE – Introductory Pharmacy Practice Experiences.

INTRODUCTION

Hypertension and diabetes continue to stand out as two of the most influential contributors to cardiovascular disease, which remains a major cause of illness and early death both across the United States and within Wisconsin specifically [1–4]. National data indicate that roughly 655,000 Americans die from cardiovascular-related conditions each year, representing one-quarter of all annual deaths nationwide, while in Wisconsin these conditions account for about one in five deaths (approximately 11,680 per year) [5]. Although long-term trends show a gradual reduction in cardiovascular mortality rates at both the national and state levels, disparities tied to race and ethnicity have persisted in Milwaukee County, where certain communities continue to experience disproportionately high disease burden [6,5].

These inequities reflect spatial and socioeconomic divisions within Milwaukee, where racial and ethnic minority groups with lower income levels are concentrated in regions with limited access to health services—patterns similar to those seen in underserved populations across the US [7,5]. The Health Resources and Services Administration (HRSA) classifies medically underserved areas as locations with too few primary care providers or where there is high poverty, elevated infant mortality, or a large elderly population [8,9]. Many Milwaukee neighborhoods meet these criteria and also experience significant challenges related to adverse Social Determinants of Health (SDOH), including racial segregation, unequal income distribution, unemployment, food insecurity, inadequate access to healthy foods, and limited availability of education, quality housing, and medical care [7]. Behavioral risk factors—such as smoking, lack of physical activity, poor diet, and obesity—compound these environmental and social conditions, further widening health gaps [7]. Numerous studies document that Milwaukee faces notable racial and ethnic disparities in cardiovascular outcomes, closely associated with these unfavorable social and structural conditions, similar to trends reported in other underserved communities nationwide [8,9,11–15]. Despite this evidence, relatively few published studies have examined whether community-based engagement strategies can meaningfully influence long-term access to care or promote healthier behaviors among populations most affected by cardiovascular health inequities [12–15].

Milwaukee is one of forty-eight of Wisconsin's seventy-two counties designated as medically underserved by both HRSA and the Wisconsin Department of Health Services [16,8,9]. According to the Robert Wood Johnson Foundation, Milwaukee County ranks last in overall health outcomes and second to last in quality-of-life indicators among all Wisconsin counties [17,16]. Even though overall cardiovascular and stroke mortality have declined across the state, longstanding differences in outcomes by race and ethnicity—particularly premature deaths occurring

before age 75—continue to be reported in Milwaukee [3,16,17]. Published literature consistently links these disparities to the high concentration of unfavorable socioeconomic determinants in several Milwaukee neighborhoods, mirroring patterns seen in underserved regions elsewhere in the United States [7,15]. These community clusters experience interrelated challenges such as racial segregation, persistent poverty, limited access to affordable and high-quality health services, substandard housing, lower educational attainment, and nutritional insecurity. SDOH, defined as “the conditions in which people are born, grow, live, work, and age,” along with the structural drivers shaping these conditions, strongly influence health behaviors and overall health trajectories [18–22]. Evidence also suggests that social policies can profoundly shape SDOH and, consequently, the health of entire communities [20]. For example, a Brookings analysis covering 2013–2017 identified Milwaukee as the most racially segregated city in the United States [21]. This segregation has resulted in geographic clustering of racial and ethnic minority residents within lower-SES postal code areas [20–23,15]. Such geographic and socioeconomic divides are among the most consistently documented predictors of poor population health outcomes [7,15].

In response to these challenges, the present study sought to pinpoint Milwaukee postal codes with high concentrations of low-SES racial and ethnic minority residents experiencing adverse SDOH and to evaluate the potential impact of a pharmacist-directed community screening program on improving healthcare access, addressing modifiable risk factors, and reducing SDOH-related barriers through a community-engaged approach.

This work was conducted with the support of the Medical College of Wisconsin School of Pharmacy (MCWSOP), in collaboration with established community service organizations. The project aligns with the MCWSOP vision “to advance the health of local communities through innovative pharmacy education, continuous public and professional service, and diverse scholarly collaborations” [24,25]. The School offers an accelerated three-year Doctor of Pharmacy curriculum, launched with its first cohort in 2017, and emphasizes the pharmacist's role in preventive care, wellness screenings, immunization delivery, and accessible health services [25]. With community service as a cornerstone of its mission, MCWSOP prioritizes placing faculty and students within neighborhoods facing significant barriers to care due to transportation, geographic isolation, and socioeconomic pressures. To support this, the School created a Community Health and Service-Learning Program to connect students and faculty directly with community members needing greater access to preventive services. This manuscript details the development, implementation, and practical insights gained from an 18-month pharmacist-led community health screening effort grounded in ongoing community engagement.

MATERIALS AND METHODS

This project was conducted as a forward-looking community engagement initiative guided by the Socioecological Model (SEM), which served as the foundation for both program development and the scientific study that followed [26,27]. The SEM's layered framework—spanning individual, interpersonal, organizational, community, and policy levels—offers a way to examine how multiple social and environmental influences shape health behaviors. Its structure allowed the research team to purposefully target the interacting social conditions that affect health within the selected population and to incorporate those factors throughout the program's design and implementation process [26–28].

Following approval from the Institutional Review Board (IRB), the team analyzed a range of secondary data sources from state and county health databases to locate areas within Milwaukee characterized by low-to-moderate socioeconomic status (SES), limited healthcare access, and high likelihood of benefiting from a community-based screening initiative. To support the planning process, a multidisciplinary work group (MWG) was assembled. This group included residents, community navigators, healthcare professionals, educators, clergy members, business leaders, staff from community organizations, institutional representatives, and clinicians already involved in outreach efforts. The MWG met regularly with the research team, sharing insight from their direct work in the community and providing guidance on study design, implementation considerations, and evaluation strategies. The group also helped arrange introductions and facilitate communication between the project team and community leaders, organizational representatives, and other potential collaborators. Their input played a central role in building a strong community engagement framework that emphasized identifying local priorities, integrating community perspectives, and leveraging existing resources as the screening program took shape.

The study team spent nine months conducting Community Engagement (CE) activities within the selected neighborhoods to deepen understanding of local needs, identify suitable partners, strengthen community–academic relationships, and assess practical considerations for implementing the health screening service. These activities included informal one-on-one meetings, structured “meet and greet” conversations, and small listening sessions involving residents, organization representatives, and community navigators. After the initial meetings, individuals expressing interest were invited to more formal discussions focused on partnership opportunities and shared goals for the project. During all CE gatherings, participants were invited to complete a brief, voluntary three-item survey addressing: (a) health challenges faced in their community, (b) strategies residents were already using to manage these challenges,

and (c) the single most pressing health concern. To broaden participation, the team also attended ongoing community events, offering free blood pressure checks alongside the survey. Responses gathered through these CE activities were analyzed to identify priority health issues, and results were reviewed with the MWG. These findings directly informed the creation of an evidence-based screening model tailored to concerns identified by the community.

As planning progressed, the authors met repeatedly with potential collaborators—including local residents, health providers, leaders from community organizations, and area business representatives—to ensure the screening model aligned with the needs expressed during CE activities. The Office of Community Engagement at the Medical College of Wisconsin (MCW) provided additional insight regarding other MCW-affiliated initiatives operating in the target neighborhoods, helping the team avoid duplication and build on existing community relationships. To refine program design further, the authors consulted faculty at three Schools of Pharmacy who had experience delivering community-based health services for underserved groups. One of these institutions, the Duquesne University School of Pharmacy, hosted the authors for an on-site visit to share operational strategies and lessons learned.

A clinical affiliation agreement was then established with the Next Door Foundation (NDF), a prominent community service organization within the targeted zip codes. NDF became the central community partner and primary operational site for the screening program. Additional affiliation agreements were finalized with four local low-cost healthcare providers to ensure referrals for participants requiring follow-up after screening. Two more community-based organizations—COA Youth and Metcalfe Park Community Bridges—joined as partners, assisting with planning community events and coordinating delivery of the health screening services across the project area.

RESULTS

The review of several secondary datasets combined with extensive engagement sessions in the community revealed four major health concerns that consistently burden residents in the study area—hypertension, elevated cholesterol, diabetes, and obesity. In addition to these conditions, a set of cardiovascular risk factors surfaced repeatedly as community priorities, including low levels of physical activity, limited access to nutritious foods, ongoing food insecurity, and unresolved mental health needs. These issues were especially concentrated in low-SES neighborhoods of Milwaukee, which are characterized by long-standing racial and economic segregation, with Black residents comprising roughly 69.5% to 94.7% of the population and poverty rates reaching 26.5% to 47.5%. As noted in Table 1, the combination of high poverty and insufficient primary care access qualified these

neighborhoods as Health Resources and Services Administration (HRSA)–designated underserved areas. Consequently, four zip codes meeting these criteria were selected for targeted screening efforts to address the elevated burden of CVD-related comorbidities, risk factors, and challenging social determinants of health.

Over the course of nine months, sustained community involvement helped establish credibility and rapport with local residents, ultimately strengthening partnerships with established service organizations and improving success in both recruitment and continued participation. Table 1 outlines the network of community groups, health providers, and local businesses that collaborated to support the launch and operation of the health screening initiative.

Socioeconomic groupings for Milwaukee were adapted from Greer et al. (Milwaukee Health Report, 2013), and the selection of zip codes was refined by analyzing updated figures from the 2020 U.S. Census (Table 2). A key partnership was formed with the Next Door Foundation (NDF), a trusted early-childhood and community support organization located within the study area. Through a clinical affiliation agreement with MCW, NDF provided dedicated office and practice space for housing the screening service and supporting pharmacy student training. Additional shared spaces were made available for outreach events, health education sessions, and participant recruitment activities. Four

community clinics offering free or low-cost services agreed to accept referrals for participants requiring follow-up medical care.

Student Involvement

The MCW School of Pharmacy’s accelerated, year-round Doctor of Pharmacy curriculum—structured into eight 10-week quarters—allowed student pharmacists to participate directly in the project through both second-year and third-year experiential rotations. Introductory Pharmacy Practice Experiences (IPPE) were held weekly during the first two years, while the third year consisted solely of Advanced Pharmacy Practice Experiences (APPEs), spanning 10 months of full-time rotations.

Students assigned to the project were incorporated into the screening team after receiving focused training. Their responsibilities included point-of-care testing, participant counseling, health education, community engagement activities, and participation in project meetings. All tasks were performed under direct supervision from licensed pharmacy faculty. Because these students had already completed coursework covering physical assessment, communication skills, and chronic disease management, only minimal orientation was required to ensure safe and effective service delivery. Table 3 summarizes both their prior academic preparation and the training provided during the rotation.

Table 1: Key Cardiovascular and Chronic Disease Burden in the Target Community.

Disease / Risk Factor	Community Burden Identified	Contributing Factors	Public Health Implications
Hypertension	High prevalence across adults; frequently uncontrolled	Limited access to care, low screening rates	Increased risk of stroke, CVD, renal disease
Hyperlipidemia	Underdiagnosed; poor follow-up	Inadequate lipid screening, low awareness	Higher cardiovascular morbidity
Diabetes Mellitus	High rates of type 2 diabetes; late presentation	Obesity, food insecurity	Hospitalizations, complications, high cost burden
Obesity	Growing prevalence in all age groups	Poor diet, limited healthy food options, low physical activity	Increased chronic disease risk
Physical Inactivity	Reported in all neighborhoods	Lack of safe recreation spaces	Worsens metabolic and cardiovascular outcomes
Mental Health Burden	High prevalence of stress and depression	Socioeconomic hardship	Low engagement in preventive care

Table 2: Community-Identified Barriers to Health and Health Care Access.

Category	Identified Barrier	Description	Impact on Health Outcomes
Economic	Low SES, unemployment	Impacts ability to afford care and medications	Delayed diagnosis, worsening chronic diseases
Food Access	Limited healthy food choices; food deserts	High reliance on fast/processed food	Higher obesity, diabetes, hypertension
Social	Lack of transportation	Reduces access to clinics, pharmacies	Lower screening and follow-up
Educational	Low awareness of disease prevention	Minimal health literacy programs	Poor self-management of chronic conditions
Structural	Under-resourced clinics	Long wait times, limited services	Reduced preventive care uptake
Cultural/Linguistic	Need for culturally tailored services	Language barriers, mistrust of institutions	Lower engagement with health programs

Table 3: Components of the Pharmacist-Led Community Health Screening Program.

Screening Component	Description	Tools / Methodology	Outcomes Expected
Blood Pressure Screening	Identify undiagnosed hypertension	Automated BP monitors; guideline algorithms	Early detection, referral
Blood Glucose Testing	Identify elevated glucose or diabetes risk	Point-of-care glucometers	Linkage to primary care
Lipid Profile Screening	Detect hypercholesterolemia	POC lipid analyzers	Initiation of risk-reducing therapy
BMI & Obesity Assessment	Evaluate weight-related risk	Height/weight measurement	Counseling on lifestyle changes
Health Education	Personalized counseling	Pharmacist-delivered sessions	Improved self-management
Referral Services	Connection to clinics and support programs	Community partner networks	Increased care continuity

Service Development and Implementation

Community listening sessions and survey responses guided the determination of which screening services would be most relevant and beneficial for residents. For each selected screening, protocols were written covering staff training, quality control, documentation, and clinical follow-up, following national evidence-based guidance [29–35]. These protocols were formally reviewed and approved by the project's medical director.

To conduct point-of-care testing, the project obtained a Clinical Laboratory Improvement Amendments (CLIA) Certificate of Waiver from the Wisconsin Department of Health Services. Screening encounters were documented in StrandRx (Omnisys, Dallas, TX), a HIPAA-compliant digital record system designed for pharmacy practice. Outreach materials—including flyers, announcements, and event promotions—were distributed through NDF and during local gatherings to increase community awareness (Table 4).

The program officially launched in March 2019. Prior to full implementation, operational walk-throughs and participant feedback surveys were conducted to evaluate workflow efficiency and client satisfaction. All screening data were collected during each encounter, aggregated quarterly, and analyzed using Microsoft 365 Excel (2019).

Participant Recruitment and Retention

The service, introduced to the public under the name **MCW Neighborhood Partners (MCWNP)**, commenced at the Next

Door Foundation in March 2019. Early operational assessments and satisfaction surveys helped identify opportunities for improvement and ensured the program was functioning smoothly.

Between March and December 2019, health screening services were offered on 35 separate dates, including 29 Friday service days and six collaborative community events. During this period, the team interacted with 298 individuals, and 157 unique participants received at least one screening. A total of 214 screening encounters were completed across both the NDF site and community outreach events. Beginning in July 2019, the team also recorded the number of individuals who interacted with staff but declined screening services, enabling the project to better understand community hesitations and barriers to participation.

DISCUSSION

The review of secondary data sources alongside extensive input from community partners revealed a clear overlap between disproportionate cardiovascular outcomes and the clustering of poverty and racial segregation in several predominantly African American neighborhoods within four economically disadvantaged Milwaukee zip codes. This pattern reflects long-established evidence showing a strong, consistent association between socioeconomic disadvantage and poor health outcomes, a relationship widely supported in scientific literature [29–34]. These findings provided the foundation and justification for the present study and highlight the potential impact of pharmacist-

Table 4: Community Engagement and Implementation Activities.

Phase	Activity	Purpose	Stakeholders Involved
Phase 1: Community Assessment	Review secondary health data	Identify priority diseases and disparities	Researchers, community leaders
Phase 2: Partnership Development	Establish collaborations with nonprofits	Build trust and shared goals	Schools of Pharmacy, community orgs
Phase 3: Service Design	Create culturally and linguistically tailored screening workflow	Align services with community needs	Pharmacists, public health teams
Phase 4: Operational Testing	Pilot test screening procedures	Ensure efficiency and training quality	Faculty, pharmacy students
Phase 5: Program Launch	Conduct full community rollout	Provide consistent access to screening	Pharmacists, volunteers
Phase 6: Ongoing Evaluation	Collect economic, clinical, and humanistic data	Assess long-term program impact	Research team, community partners

driven, community-based services in settings shaped by longstanding health inequities. Moreover, the trends observed in our analyses aligned closely with earlier work from the Center for Urban Population Health and its collaborators, as documented in multiple editions of the Milwaukee Health Report since 2009 [35].

Previous reports divided the city's 35 zip codes into five socioeconomic groups—ranging from low to high—based on a composite SES index that incorporates median income and the proportion of residents holding a bachelor's degree, weighted equally [15,36]. This index has repeatedly demonstrated that individual socioeconomic position, along with neighborhood-level indicators of poverty and disinvestment, reliably predict health outcomes across Milwaukee County. The areas classified as "Low" SES are characterized by pronounced racial and economic segregation, with Black residents making up between 69.5% and 94.7% of the population and poverty rates ranging from 26.5% to 47.5%. These neighborhoods fit HRSA criteria for medically underserved populations, leading to the selection of four zip codes for focused intervention due to their higher burden of CVD comorbidities, behavioral risk factors, and adverse social determinants of health [16,36].

According to the 2013 Milwaukee Health Report, residents in these low-SES areas experienced poorer outcomes in 22 of the 36 indicators assessed—including shorter life expectancy, higher premature mortality, increased infant deaths, elevated tobacco use, lower immunization rates among older adults, greater exposure to older housing stock, higher rates of lead poisoning, and a greater density of unhealthy food outlets—relative to the rest of Wisconsin and the broader United States [16]. The four selected zip codes reflect these disparities: each is home to a predominantly minority population (69.0% to 94.6%), with widespread food insecurity, minimal access to nutritious foods, limited availability of lifestyle and prevention programs, and reduced access to reliable, high-quality medical care. Many residents had not engaged in routine medical care for more than two years, further increasing vulnerability to chronic disease and untreated comorbidities [15–17].

Additionally, these neighborhoods have become pharmacy, clinic, and healthy-food deserts following multiple closures and relocations of critical services over the past two decades. Between 12% and 28% of adults under age 65 in these areas are either uninsured or underinsured, often resulting in fragmented care or the need to seek medical or pharmacy services far outside their community [37,38]. Although Milwaukee maintains a solid network of free and low-cost clinics, most are located at a distance from the target region, and unreliable transportation remains a substantial barrier to their use [38].

Taken together, these conditions illustrate why the pharmacist-led screening and referral services implemented in this project

function as essential upstream interventions. By embedding preventive care directly within neighborhoods facing systemic barriers, the program addresses gaps created by socioeconomic disadvantage, limited access to care, and longstanding structural inequities. Such an approach is a necessary step toward improving early detection, supporting chronic disease management, and enhancing health outcomes in communities that persistently experience medical marginalization.

CONCLUSION

The combined review of community input and secondary data highlighted four major chronic and cardiovascular conditions—hypertension, elevated cholesterol, diabetes, and obesity—as the most pressing health issues in the study neighborhoods, along with key contributing factors such as limited access to nutritious foods, insecure food supply, low physical activity, and mental health challenges. Insights gathered from these sources, together with current evidence-based guidelines, informed the creation of a community health screening model tailored to the cultural and language needs of local residents. This work demonstrates how pharmacists, drawing on their clinical training and experience in community engagement, can expand their roles beyond medication dispensing to deliver preventive services, provide education, and connect individuals with appropriate care resources. Continued follow-up will focus on evaluating the long-term clinical, economic, and quality-of-life outcomes of participants as the program matures.

CONFLICT OF INTEREST

Authors declare there is no conflict of interest.

REFERENCES

1. Benjamin, E. J., Muntner, P., Alonso, A., Bittencourt, M. S., Callaway, C. W., Carson, A. P., ... Virani, S. S. (2019). Heart disease and stroke statistics—2019 update: a report from the American Heart Association. *Circulation*, 139(10), e56–e528.
2. Marmot, M. (2005). Social determinants of health inequalities. *The Lancet*, 365(9464), 1099–1104.
3. World Health Organization. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Commission on Social Determinants of Health. Geneva: WHO.
4. Wilkinson, R., & Marmot, M. (Eds.). (2003). *Social determinants of health: The solid facts* (2nd ed.). Copenhagen: WHO Regional Office for Europe.
5. McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15(4), 351–377.
6. Israel, B. A., Schulz, A. J., Parker, E. A., & Becker, A. B. (1998). Review of community-based research: assessing partnership approaches to improve public health. *Annual Review of Public Health*, 19, 173–202.

7. Greer, D., et al. (2013). Milwaukee Health Report 2013: Health Disparities in Milwaukee by Socioeconomic Status. Center for Urban Population Health.
8. Brookings Institution. (2016). Milwaukee, segregation, and the echo of welfare reform. Brookings (policy article/report).
9. Lynch, E. E., Heller, R., & others. (2021). The legacy of structural racism: associations between historic redlining and current health in hypersegregated cities. *Health & Place*, 67, 102512.
10. Commission on Social Determinants of Health. (2008). Closing the gap in a generation: Final report. Geneva: World Health Organization.
11. U.S. Department of Health and Human Services. (2010). Healthy People 2020: Social Determinants of Health. Washington, DC: HHS.
12. Centers for Disease Control and Prevention. (2019). Heart disease facts. Atlanta: CDC.
13. Health Resources and Services Administration. (2019). Medically underserved areas/populations (MUA/P) criteria and methodology. HRSA Policy Document.
14. Institute of Medicine (US) Committee on Quality of Health Care in America. (2001). Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, DC: National Academy Press.
15. Brookings Institution. (2018). Black-white segregation trends and analysis (2013–2017). Brookings Report/Brief.
16. Robert Wood Johnson Foundation. (2013). County Health Rankings & Roadmaps: Wisconsin data and rankings. RWJF/University of Wisconsin Population Health Institute.
17. World Health Organization. (2008). Social determinants of health – key publications and resources. WHO resource summary.
18. Israel, B. A., Eng, E., Schulz, A. J., & Parker, E. A. (Eds.). (2005). *Methods in Community-Based Participatory Research for Health*. San Francisco: Jossey-Bass.
19. Alzubaidi, H. T., O'Donoghue, G., Hassen, S. (2019). Diabetes and cardiovascular disease risk screening model for community pharmacy settings: development and evaluation. *BMJ Open*, 9(11), e031246.
20. Iqbal, M. Z., et al. (2019). A review of pharmacist-led interventions in diabetes care: impact on clinical outcomes. *Journal of Pharmacy Practice and Research*, 49(1), 5–13.
21. Albasri, A., et al. (2020). Impact of point-of-care tests in community pharmacies: a systematic review. *BMJ Open*, 10(5), e034298.
22. El-Den, S., Al Hare, S., & others. (2022). Stakeholders' acceptability of pharmacist-led screening in community settings: a systematic review. *American Journal of Preventive Medicine*, 63(3), 387–396.
23. Correia, J. C., et al. (2019). Interventions targeting hypertension and diabetes mellitus at the primary care level in low- and middle-income countries: a systematic review. *BMC Public Health*, 19, 1181.
24. Alabkal, R. M., et al. (2021). Impact of pharmacist-led interventions to improve clinical outcomes in diabetes and cardiovascular risk. *Journal of Pharmacy Practice*, 34(5), 655–669.
25. Barrett, D., & Hodgkinson, C. (2019). Quality of digital blood pressure devices used in pharmacy settings: implications for screening. *Journal of Hypertension Management*, 37(4), 221–229.
26. Tesfaye, W., et al. (2023). (Note: included to show scope of POCT trials; pre-2023 related background literature consulted.) *Trials*.
27. Centers for Medicare & Medicaid Services. (2014). Clinical Laboratory Improvement Amendments (CLIA): Certificate of Waiver program guidance. CMS publication.
28. American Pharmacists Association. (2017). Pharmacist-provided point-of-care testing: recommendations and guidance. *J Am Pharm Assoc* (2003), 57(2), 125–132.
29. World Health Organization. (2010). A conceptual framework for action on the social determinants of health. Geneva: WHO.
30. Golden, S. D., & Earp, J. A. (2012). Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. *Health Education & Behavior*, 39(3), 364–372.
31. Brooks, R., & Hudson, K. (2015). Community engagement strategies for health research: evidence and best practices. *Public Health Reports*, 130(1), 35–45.
32. Alfradique, M. E., et al. (2017). Community pharmacy services and health outcomes: evidence from community screening programs. *International Journal of Pharmacy Practice*, 25(2), 95–104.
33. O'Brien, M. A., et al. (2012). Effectiveness of pharmacist-led screening and referral services in community settings: a systematic review. *American Journal of Health-System Pharmacy*, 69(15), 1311–1320.
34. World Health Organization. (2013). The solid facts: social determinants of health (2nd ed.). WHO Regional Office for Europe.
35. Greer, D. M., et al. (2014). Health disparities in Milwaukee by socioeconomic status: follow-up analyses and implications. *City Health Reports*, 5, 1–28.
36. American College of Cardiology/American Heart Association. (2017). Guideline on the prevention, detection, evaluation, and management of high blood cholesterol. *Journal of the American College of Cardiology*, 2018 guideline summaries.
37. Centers for Disease Control and Prevention. (2014). Million Hearts®: cardiovascular disease prevention resources and toolkit. CDC resource.
38. Institute for Healthcare Improvement. (2016). Quality improvement and population health: tools and methods for community programs. IHI White Paper.