

Enhancing Patient Outcomes: The Role of Point-of-Care Testing in Community Pharmacies

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Abstract:

Point-of-care testing (POCT) has emerged as a revolutionary diagnostic tool that allows the diagnosis and monitoring of the patients' health status immediately where they are without the need of sending a sample to the pathology lab. The use of POCT enabled prompt decision-making, personalized patient care, and improved medication adherence, leading to better health outcomes. POCT has significantly enhanced patient outcomes in the healthcare system, including community pharmacies. Community pharmacies, being highly accessible healthcare hubs, are ideally positioned to implement POCT. Overall POCT has helped to bridge certain gaps in healthcare delivery.

This review explores the pivotal role of POCT focusing on its impact on the timely diagnosis and management of various health conditions including infectious diseases. Furthermore, this review also examines the challenges and prospects of POCT in community pharmacies, highlighting the need for standardized protocols, adequate training and documentation, and robust quality control measures to maximize its benefits. Conclusively, the use of Overall POCT in community pharmacies holds great potential for enhancing patient care and advancing public health.

Keywords: Point-of-care testing, community pharmacy, patient outcomes, diagnostic services, non-communicable diseases, infectious disease screening, pharmacist-led testing, healthcare accessibility.

1. INTRODUCTION

Point-of-care testing (POCT) is a diagnostic test performed by well-trained and qualified personnel attending a patient, who make the results of the clinical investigation available to the patient during the same clinical visit. The potential of the POCT in community pharmacies lies in the ease and promptness in decision making that is possible due to timely testing without delay.¹ Figure 1 is a representation of several benefits offered by POCT in community pharmacies.

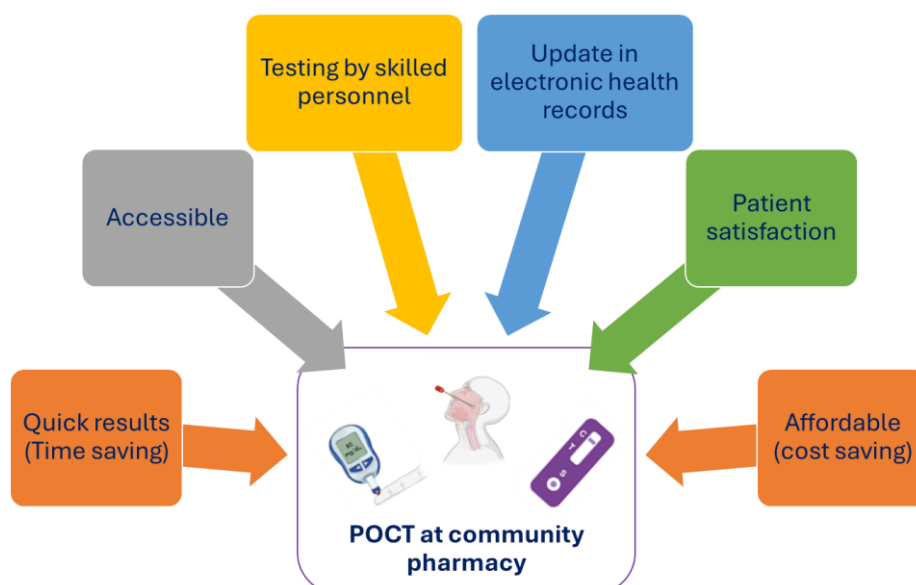


Figure 1. Advantages of POCT at community pharmacies.

It is a promising platform for increasing the efficiency of patient diagnosis to provide an insight into the treatment of patients. POCT in community pharmacies is a solution to several concerns that pharmacists and patients have daily while being on medication that needs regular health monitoring. Moreover, patients find community pharmacists easy to access in comparison to the longer waiting times for physicians and hospitals for some important pathological tests. This works in favour of the pharmacists who play a significant role in diagnosis, interpretation and planning of treatment options for the patients without delays.²

Health parameters indicate the status of the overall health of an individual and hence regular testing is essential for communicable and non-communicable diseases. For the basic screening such as blood glucose, blood pressure, testing for certain diseases such as malaria or influenza, the POCT facilitates quick and non-invasive testing at the local community pharmacy. POCT has already proven its significance during the COVID-19 times, when simple parameters such as body temperature, oxygen status and respiratory rate were preliminary check points that helped in diagnosis and curbed further spread of the infection.² In addition to ruling out the infections quickly by the POCTs, their implementation at the community pharmacy further helps in regulating dispensing of antimicrobials so that unnecessary use of antimicrobials can be prevented. While hospitals and larger health care settings are often overloaded with patients, POCTs at the community pharmacy bring relief to many patients due several advantages.³

This review discusses different POCTs carried successfully at the community pharmacy setting and advantages and challenges that are faced in the working of this type of screening platforms.

2. COMMONLY USED MEDICAL DEVICES FOR POCT IN COMMUNITY PHARMACY:

For successful working of the POCT in any community pharmacy, it is necessary to have calibrated medical devices and appropriate reagents for the testing. Well trained pharmacy technicians and community pharmacists can provide reliable test results. Typically, in a community pharmacy non-invasive sample collection processes, fast-result yielding devices, and immediate care are preferred.⁴ Classification of POCTs in community pharmacy based on availability is shown in figure 2.

Common	Variable	Emerging
<ul style="list-style-type: none"> • Blood glucose • Blood electrolytes • Hemoglobin • Pregnancy test • Strep test • Covid-19 	<ul style="list-style-type: none"> • Cardiac marker • HbA1c • D-Dimer test • HIV • Influenza • H. pylori 	<ul style="list-style-type: none"> • CBC • WBC • Sepsis marker • Platelet function • Cancer marker • Endocrine testing

Figure 2. A few representative examples of POCTs classified according to their availability

A systematic review has compiled some commonly used medical devices for POCT in different studies. Out of the different devices mentioned in the review few are mentioned here. For example, Cholestech LDX Analyser by Alere for lipid testing, Accutrend GC by Roche for total cholesterol, DCH Vantage Siemens for HbA1c, SB Bioline Malaria Ag by Alere for malaria testing and INR Coagucheck XS Plus by Roche for testing blood clotting time.¹

2.1 POCT for cardiovascular diseases (CVD) patients:

Each year millions of deaths are attributed to non-communicable diseases and metabolic health is an important check point for such diseases. CVD is the leading cause of death globally with around 17.79 million people reported to have been dead in 2017 due to CVD. Many patients who are undergoing therapy for CVD fail to achieve their risk factor goals. This needs regular screening for the risk factors.⁵

Hypertension is a major identified risk factor and globally 19% of deaths occur due to elevated blood pressure. Hence, these patients require regular monitoring of their blood pressure using medical devices that are software enabled. Providing the POCT for such patients becomes an easy task for pharmacists, as they can perform the test on patients in their setting. Using calibrated devices, the test conducted by the pharmacists provides reliable results and rapid detection results in quick treatment. Moreover, the community pharmacy can provide a schedule to the patients for their further visits so that regular monitoring of blood pressure is possible.⁶⁻⁸ There have been studies carried by chains of community pharmacy where they have developed wellness programmes for checking various health parameters of workers including hypertension and these patients have shown significant health improvements.⁹

Dyslipidemia is a prevalent condition and an identified risk factor for CVDs that requires regular monitoring. With the growing prevalence of this condition, there is a heavy burden on healthcare systems to manage these patients. At such times, POCT at community pharmacy is a boon to many patients. According to a study published by Garcia D et al, community pharmacies were involved in testing lipid profile of patients using Afinion™ 2 POCT (Abbott Rapid Diagnostics). The results indicated that shifting patients for POCT under community pharmacy proved was cost saving and fast.¹⁰ A study carried in Portuguese community pharmacy patients showed analysis of lipids from whole blood using Cobas b101 system (Roche, Basel, Switzerland). Furthermore, the pharmacists and technicians received a formal training for using the medical devices for POCT and counselled patients to improve adherence to the treatment.⁵

2.2 POCT for people with Diabetes in community pharmacy

Diabetes has been affecting millions of people globally and requires constant monitoring of blood glucose as it may result in chronic kidney disease or retinopathy and other neurological complications if left untreated. The study carried on the POCT in community pharmacy carried glucose monitoring of patients using Afinion 2 POCT for HbA1c. The results show that community pharmacy settings provide cost effective diagnosis and quicker results.¹⁰ A Brazilian community pharmacy carried HbA1c testing in people that helped in diagnosing people having prediabetic condition and those with pre-diagnosed diabetes. This assisted in faster screening for pre diabetes and referring these patients to appropriate treatment.¹¹ A review that studied devices used in POCT for diabetes and outcomes in a community pharmacy setting emphasized that standardised devices and strong infrastructure in community pharmacy setting can be beneficial for prediabetes determination and also diagnosis of diabetes that will eventually help in preventing the dreadful side effects if the disease progresses without proper intervention.¹²

2.3 POCT for infectious diseases

Most infections are caused by viruses, bacteria, protozoa and other microorganisms and are transmitted in people resulting in diseases that may be at times life threatening. POCT at community pharmacy covers infections such as malaria, influenza, COVID and Hepatitis-C virus (HCV) and HIV. In the United States (U.S) the Food and Drug Administration (FDA) approves tests done by pharmacists possessing the Clinical Laboratory Improvement Amendments application or CLIA waiver. Hence pharmacists are able to carry out the detection tests for the infectious diseases with proper training.⁴ Detection of infection and prevention of transmission are the main objectives of POCT for infectious diseases.

A study that covers the POCT in settings such as community pharmacies in the Europe emphasizes the potential use of devices used in POCT during the COVID-19. It also emphasizes the benefits of POCT as an interface between patients and hospitals. Malaria being a major health problem in the world the POCT with accurate, sensitive, and precise detection kits help early detection and treatment.¹³ Thousands of pharmacies across the U.S. carry out Influenza POCT which benefits patients to begin early antiviral treatment if needed. Collaborative efforts make influenza 'test and treat' at the community pharmacy a critical point in diagnosing flu cases.¹⁴ Moreover, the POCTs for flu also provide important information regarding use of antimicrobials to treat such diseases and eventually help in clinical research dealing with vaccine effectiveness and the trials that are conducted in the real world. The timely diagnosis of flu with POCT helps to control its spread in household and resolve symptoms and reduce complications in high-risk patients.¹⁵ A recently published review indicated that community pharmacists are in a great position to offer quick tests for respiratory

infections.¹⁶ POCTs of respiratory infections help solve common problems, such as difficulty booking doctor appointments, managing tight schedules, or traveling long distances to see a healthcare provider. This makes it easier and more convenient for patients to get tested and treated.¹⁶

HCV and HIV detection is also practiced at community pharmacies using devices approved for POCT. Often these patients acquire infections due to risky sexual behaviour. Providing POCT at pharmacy level for such patients improve the chances of referring them to clinical centres for treatment, retention rates of treating these patients improve and moreover counselling at the pharmacy during the POCT helps mitigate the risk.¹⁷ In a study carried in Canadian community pharmacies, POCT has proven to be effective in baby boomers for HCV detection that helps in elimination goals for this disease in the nation.¹⁸ A study by Mital S et al compared the self-testing with POCT at community pharmacy for HIV and found that POCT was a cost effective option. Significant cost savings and improved health outcomes were seen in pharmacist-led POCT.¹⁹

Overall, POCT at the community pharmacy setting has proven to be beneficial in the U.S. and several other countries around the world in different aspects. POCT offers better patient acceptance, is cost effective and makes early diagnosis and treatment possible. This helps to prevent the spread of infectious diseases. In case of non-communicable diseases, POCT helps in identifying risks for health threatening complications that may arise due to conditions such as hypertension and diabetes. Efficient and well-trained pharmacists with approved and calibrated devices for POCT make diagnosis and follow up easy and effective for patients.²⁰ With a huge burden of diagnosis and treatment at the primary healthcare units and hospitals, the POCT at community pharmacy helps to streamline the process and identify risks thus helping patients. Moreover, ease of reaching out to pharmacists as compared to the wait time in hospitals and the expert knowledge of pharmacists on the appropriate use of medicines make the entire process more reliable and eases the burden on healthcare system.¹

3. CHALLENGES IN CLINICAL PRACTICE OF POCT AT PHARMACIES

Although POCTs offer numerous benefits, there are certain challenges in implementing POCT in community pharmacies.

Testing errors and analytical quality: Ensuring the reliability of the POCT is crucial for effective patient care. Some POCT devices may not be as accurate as traditional lab tests. POCT devices are portable and often exposed to variable temperature, humidity, light, and oxygen conditions during storage and transport. This affects the stability of reagents used for testing and may not give an accurate result.²¹ In addition to this, improper handling of a biological sample and/or lack of experience in analytical procedure may give erroneous results.²² A review conducted based on systematic search of six different electronic databases evaluated the effectiveness and analytical quality of POCTs performed in the community pharmacy and concluded acceptable analytical quality compared to the laboratory standard.²³ This review emphasized that analytical errors usually occur due to improper sample collection, false internal quality control, incorrect interpretation due to variability in different POCT devices etc.

Cost: POCT devices can be expensive, and the cost of maintaining inventory, reagent storage, record keeping, and the need for additional personnel for testing may increase the cost of the testing. POCT additionally requires several ancillary supplies like specimen collection materials, quality control materials, and disposables. These costs can add up over time and may adversely affect the overall cost of POCT. Some suppliers of POCT have requirements of minimum order quantity that influences the overall inventory management and the turn over of rate. The current POCT technologies based on advanced technological features that give more accurate results and less discrepancies are often bound to have more cost.²⁴ A guide by NCPA (National Community Pharmacists Organization) outlines the challenges and strategies for implementing POCT services in community pharmacies, touching on financial aspects such as cash-pay models and insurance reimbursements.²⁵

Standardization: There is a lack of standardization across different POCT devices and tests. This can lead to inconsistencies in test results and make it difficult to compare outcomes. A recently published scoping review highlights the challenges in regulating and standardizing POCT devices, emphasizing how inconsistent

governance models can lead to variability in test results.²⁶ Another review explored the importance of standardization and accreditation in POCT to reduce inconsistencies and improve patient care.²⁷

Training: Proper training for pharmacy staff is essential to ensure they can use POCT devices correctly and interpret the results accurately. This can be a barrier, especially in remote or underserved areas. Proper training equips pharmacists with the skills to use POCT devices correctly, ensuring accurate results. For example, a trained pharmacist can effectively use a glucose meter to monitor diabetes or a rapid antigen test for infections like COVID-19. Training helps pharmacists understand quality control procedures, reducing the risk of errors. For instance, pharmacists trained in quality control lockout features can ensure that devices are not used if quality control checks fail. Training ensures pharmacists meet legal and regulatory standards, such as obtaining a Clinical Laboratory Improvement Amendments (CLIA) waiver for conducting POCT.²⁸ Trained pharmacists can interpret test results and guide patients on next steps. For example, a pharmacist trained in lipid panel testing can counsel patients on managing high cholesterol. Training also enhances the credibility of pharmacists as healthcare providers. Patients are more likely to trust pharmacists who demonstrate expertise in using POCT devices,²⁹

Quality Control: Maintaining quality control and assurance is vital. This includes ensuring that only trained personnel have access to the devices and that there is a track record of who conducted the tests. Quality control testing, is done before using devices for patient testing to make sure they are working correctly and giving accurate results. POCT devices are often easy to use, but because healthcare workers have many tasks to juggle, they might sometimes skip this important step. However, quality control testing is essential to ensure patient safety and reliable results.³⁰ Choosing POCT devices with a quality control lockout feature is a good idea because this stops the device from being used if quality control hasn't been done on time or if the quality control results are not within the acceptable range. When these devices are connected to a data management system, it becomes easier to track and review the quality control results for both the devices and the people using them. This helps maintain high-quality testing over time.³⁰

Integration with Healthcare Systems: Earlier Community pharmacies used to mainly focus on giving out medicines prescribed by doctors. But now, they do much more. They work closely with patients to ensure their medicines are used correctly, manage treatments effectively, provide personalized care, and diagnose the disease using POCT. The goal is to improve health outcomes and support patients in managing their overall health. Integrating POCT results with patients' electronic health records (EHR) can be challenging. This integration is necessary for seamless clinical workflows and better patient care. A recent review highlighted that facts that various services provided by community pharmacists improve the clinical and behavioral outcomes and indicate benefits in economic and humanistic outcomes.³¹ The integration of pharmacy services into healthcare systems worldwide will help support the shift to a patient-centred approach.

4. CONCLUSION

Community pharmacies now offer quick and easy diagnostic tests right at the pharmacy with the help of POCT. Therefore, diagnosis of certain health parameters is now more accessible, convenient, and also affordable. The results are considered reliable as testing is done by skilled and trusted pharmacists. The integration of POCT into community pharmacies represents a significant step toward improving patient outcomes by offering timely diagnostic services, increasing accessibility, and empowering pharmacists to play a major and significant role in healthcare domain. However, the successful implementation of POCT faces several challenges, including the need for comprehensive training of pharmacists, standardization across devices and testing protocols, and addressing regulatory and quality control requirements. Overcoming these challenges will require collaborative efforts among healthcare professionals, policymakers, and device manufacturers. By addressing these barriers, POCT in community pharmacies has the potential to transform patient care and strengthen the healthcare system at large.

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