Exploring the Adoption of Point-of-care Testing for Acute Respiratory Infectious Diseases in Community Pharmacies.

by

Omar Elhosseiny Ahmed

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Abstract

Background: Acute respiratory infectious diseases such as strep throat, influenza, and COVID-19 pose significant public health challenges. Community pharmacists in Canada have a broad scope of practice. They have been involved in assessing and prescribing for minor ailments, ordering laboratory tests as well as conducting point-of-care (POC) testing for screening and detection of acute and chronic health conditions. POC testing for acute respiratory infectious diseases represents a feasible approach to healthcare delivery and a strategy for early detection and management of these conditions within community pharmacies. The service has led community pharmacists to offer "test and treat" services for patients with symptoms of these conditions. However, the uptake and sustainability of this service are influenced by a wide range of implementation factors (i.e., enablers and barriers) that impact its widespread adoption in community pharmacies.

Goals and objectives: The overall goal of this thesis is to explore the adoption of POC testing for acute respiratory infectious diseases and inform the development of future studies on the implementation of the service in community pharmacies. Within the two thesis projects, I sought to 1) summarize the literature on enablers and barriers to POC testing implementation for acute respiratory infectious diseases in community pharmacies, 2) explore community pharmacists' experiences, attitudes, and confidence in offering POC "test and treat" services in Alberta, Canada.

Methods: The first project, a theory-informed scoping review guided by the JBI Manual for Evidence Synthesis involved a search strategy of 6 databases from inception to June 28th, 2022. We synthesized the factors influencing the implementation of the service in community pharmacies using content analysis and mapped them to the Consolidated Framework for

Implementation Research (CFIR). The second project was an online cross-sectional survey sent to 4,035 community pharmacists in February 2024 and informed by the Theoretical Domains Framework (TDF) and the Capability-Opportunity-Motivation-Behavior (COM-B) Model for behavior change. The survey collected information regarding POC testing provision, pharmacists' experiences as well as the perceived enablers and barriers towards POC "test and treat" services in community pharmacies.

Results: In Project 1, We included 43 studies in the final analysis. The majority of studies originated from the USA (n=24) and investigated strep throat. Thirty-six (84%) studies used quantitative methodology, while 6 (14%) were qualitative. Twenty-three studies were in the testing phase conducted in urban centers (n=17), and only four studies used theory to inform their findings. We identified 124 implementation factors and mapped them onto 21 CFIR constructs covering all 5 domains. The most prevalent domain was "Outer setting" (n = 35/43; 81%) and construct was "Patient needs and resources" (n = 21/43; 49%). The review explored a wide range of factors influencing the implementation of the service in community pharmacies.

In Project 2, out of 413 responses collected (response rate: 10.2%), 370 were included in the final analysis representing a completion rate of 9.2%. Two-thirds of respondents (65%) were active providers of POC testing for respiratory infectious diseases and strep throat testing was the most commonly provided, performed by 60% of all respondents. Active providers were more likely to hold additional prescribing authorization (APA), be internationally educated, practice in a franchise pharmacy, and be confident in providing respiratory POC testing than inactive providers (all $P<0.001$; univariate analysis). Inactive providers had significantly lower agreement on important TDF domains including "Knowledge," "Skills," and "Organization" than active providers. There was no difference in the proportion of active providers compared by urban and rural status.

Conclusion: This thesis provided a comprehensive exploration of the implementation factors influencing POC testing implementation for acute respiratory infectious diseases in community pharmacies. The use of POC testing was perceived by community pharmacists to be advantageous and supportive of antimicrobial stewardship. Training community pharmacists is essential to ensure successful service implementation. Reimbursement availability plays a crucial role in facilitating widespread service adoption. Understanding pharmacists' attitudes and confidence toward these services is important for supporting the implementation process. Knowledge of the wide range of barriers and facilitators as well as capturing Alberta pharmacists' experiences could assist pharmacy managers and future researchers in the selection of appropriate tools and strategies to foster the implementation and sustainability of these services over time.

Preface

This thesis is an original work by Omar Elhosseiny Ahmed.

Chapter 2 of this thesis has been published as Omar E. Abdellatife, Mark J. Makowsky, "Factors Influencing Implementation of Point-of-care Testing for Acute Respiratory infectious Diseases in Community Pharmacies: A Scoping Review Using the Consolidated Framework for Implementation Research," Research in Social and Administrative Pharmacy, vol. 20, issue 6, 1-24. I was responsible for the conception and design, acquisition and data analysis, data interpretation, and manuscript composition. Dr. Makowsky contributed to the conception and design, acquisition and data analysis, data interpretation, and manuscript revision. Dr. Sherif Mahmoud and Dr. Denise Campbell Scherer assisted with the conception and design of the review project. Janice Kung assisted with the database search.

The research project described in Chapter 3, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, *Point-of-care Testing for Acute Upper Respiratory Tract Infections and Ordering of Laboratory Tests by Community Pharmacies in Alberta: A Cross-Sectional Survey,* Pro00137768.

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1.1.1. Overview of Acute Respiratory Infectious Diseases

Respiratory tract infections (RTI) arise from pathogens such as bacteria and viruses, affecting the respiratory system including the throat and lungs[1]. Upper respiratory tract infections are mainly caused by viruses and affect the sinuses, throat, and ears such as common cold, pharyngitis, sinusitis, and acute otitis media. On the other hand, lower respiratory tract infections are caused by bacteria or viruses and affect the airways and lungs such as bronchitis, bronchiolitis, and pneumonia[2, 3]. These illnesses pose a significant health challenge particularly common during the fall and winter seasons.

In the United States, non-invasive strep throat causes an estimated 5.2 million outpatient visits and 2.8 million antibiotic prescriptions annually among US persons aged 0–64 years[4]. The Centers for Disease Control and Prevention (CDC) monitors invasive group A streptococcal infections by means of the Active Bacterial Core Surveillance (ABCs) program. In the year 2021, a total of 20,910 cases were reported, resulting in 1910 fatalities[5]. Public Health Ontario in Canada documented a total of 1,008 confirmed cases of invasive Group A Streptococcus (GAS) infection between October 1, 2023, and February 29, 2024, resulting in an overall incidence rate of 6.5 cases per 100,000 individuals[6]. The age group of 65 years and above exhibited the highest incidence rate at 11.0 cases per 100,000 population, followed by the five to nine age group with 8.2 cases per 100,000. By February 29, 2024, 8.1% (10 out of 124) of the cases among individuals under 18 years old had a reported fatal outcome, exceeding the proportion observed in the previous season, which stood at 1.9% for cases under 18 years old[6].

As of March 26th, 2024, Canada has recorded a total of 4,944,196 cases of COVID-19, accompanied by a total of 58,972 deaths[7]. Currently, there have been 111,735,057 COVID-19 cases in the United States, and the CDC has documented a total of 6,891,605 hospitalizations associated with 1,185,413 deaths on March 27th, 2024[8, 9].

The CDC estimated that during the 2021-2022 season, there were approximately 9.4 million cases of influenza, 4.3 million visits to medical facilities due to flu-related symptoms, 100,000 individuals hospitalized because of the flu, and 4,900 deaths attributed to influenza.[10]. Canada reported 776 hospitalizations and 22 deaths due to influenza in the 2021-2022 season[11]. From August 27, 2023, to March 16, 2024, a total of 3,934 hospitalizations associated with influenza were documented by provinces and territories actively participating in the surveillance[12]. The demographic group with the highest cumulative rates of hospitalization comprised adults aged 65 years and older (126 per 100,000) and children under the age of 5 (80 per 100,000). Furthermore, at nine designated hospital sites, a total of 902 pediatric cases of hospitalizations related to influenza were recorded[12].

During the 2023-2024 respiratory illness season, Alberta recorded 5,039 laboratory-confirmed RSV cases[13]. According to the CDC, RSV causes 58,000-80,000 hospitalizations in the United States each year among children under 5, resulting in 100-300 deaths. It also leads to 60,000-160,000 hospitalizations in adults aged 65 and above, with 6,000-10,000 fatalities.[14].

1.1.2. Etiology of Acute Respiratory Infectious Diseases

Pathogens causing sore throat are mostly caused by viruses, however streptococcal pharyngitis, also known as strep throat, is caused by a bacteria called streptococcus pyogenes, Group A streptococcus (GAS), and affects the throat and tonsils. Group A streptococcus is very contagious and can be spread through respiratory droplets and/or direct contact[15]. Common symptoms may include fever, pain when swallowing, sore throat, red and swollen tonsils, and white patches of pus on the tonsils. Some individuals are at increased risk of strep throat. For example, it is more likely to occur in children between 5 and 15 years than adults and less likely to occur in children younger than 3 years old[15]. In rare cases, the bacteria can be invasive and invade the bloodstream causing life-threatening illnesses such as acute rheumatic fever, and glomerulonephritis[6, 15].

COVID-19 is the disease caused by the SARS-Cov-2 virus that was first identified in Wuhan, China. The disease was declared an international public health emergency on January 30th, 2020, and a pandemic on March 11th, 2020[16]. The virus is highly contagious and symptoms resemble a cold, the flu, or pneumonia[17]. It may also involve the lungs and other organs of the body. It has the same mode of transmission as strep throat and influenza. Some patients become severely ill, and it accounts for numerous hospital admissions and mortalities[7, 17]. A new variant of SARS-Cov-2 emerged in 2021 called the Omicron variant[18]. The Omicron variant displays a multitude of lineages, with ongoing dissemination of novel lineages observed in the United States, Canada, and worldwide[18, 19].

Influenza, also known as the flu, is caused by influenza viruses A and B and affects the nose, throat, and sometimes the lungs. Common symptoms include fever, cough, sore throat, runny or stuffy nose, muscle or body aches, and fatigue. Similar to strep throat, it can be spread via respiratory droplets and/or direct contact. The disease is usually mild, but sometimes it can lead to hospitalization and death[20]. Complications of influenza may include secondary bacterial pneumonia, ear and sinus infections, and worsening of chronic medical conditions[20].

Respiratory syncytial virus (RSV) affects the respiratory system and usually causes mild cold-like symptoms in healthy adults and children that last for a few days, however, it may lead to serious complications such as bronchiolitis and pneumonia in infants less than 1 year old and the elderly that may require hospitalization for supportive care[14].

1.1.3. Management of Acute Respiratory Infectious Diseases

The course of strep throat, influenza, and COVID-19 can be affected if the disease is identified early and appropriate therapy is initiated especially in those with risk factors for progressing to severe disease[21]. However, one of the main concerns primary care physicians encounter when dealing with patients presenting with upper respiratory symptoms is establishing viral and bacterial causes[22] and a differential etiological diagnosis needed to tailor the most appropriate treatment[23]. For example, bacterial and viral pharyngitis can not be reliably distinguished based solely on the clinical manifestations except when excessive viral symptoms are present such as rhinorrhea and cough and this could result in an overuse of antibiotics[22, 24, 25]. Excessive and inappropriate antibiotic use for viral infections contributes to possible side effects for the patient, the development of antimicrobial resistance, and increased healthcare expenditure[26-28]. Antimicrobial resistance is even worse when broad-spectrum antibiotics are prescribed unnecessarily. Therefore, appropriate assessment and management of patients presenting with upper respiratory symptoms is an important step in promoting antibiotic stewardship[22].

Typically, diagnosis is usually based on the clinical presentation of signs and symptoms the use of clinical prediction rules, microbiological testing (i.e., throat culture), and laboratory tests for biomarkers indicating infection[23]. For example, clinical practice guidelines recommend the assessment of patients presenting with pharyngitis involving the use of prediction rules which increase the likelihood of infection caused by Group A streptococcus. For example, the Centor score uses 4 criteria which are fever, pharyngotonsillar exudates, tender anterior cervical lymphadenopathy, and lack of cough, where a point is added for each of the criteria present, and the overall score is between 0 and 4[29]. Based on the clinical practice guidelines such as the Infectious Diseases Society of America (IDSA) and the National Institute for Health and Clinical Excellence (NICE), patients with one or none of these criteria possess a very low chance of being infected by Group A streptococcus and do not require further diagnostic or therapeutic intervention with antibiotics[22, 30]. Neither clinical manifestations nor the Centor score is sufficient to rule out bacterial pharyngitis because even patients scoring 4 on the Centor score have a probability of infection with group A streptococcus of only 39% to 57% and are subject to clinical judgment[23]. Further, a throat culture is the gold standard for etiology detection but takes time to obtain the results, and this could affect the time to initiate treatment[23]. Given that bacterial pharyngitis accounts for approximately 10% to 15% of cases in adults and 15% to 30% of cases in children, it would be appropriate to supply antibiotics only for almost 10% of adult cases presenting with pharyngitis in primary care to reduce the contagious life span, symptom severity and potential complications such as acute rheumatic fever and post-streptococcal glomerulonephritis [23, 31-33].

In terms of COVID-19, clinical practice guidelines recommend assessment with molecular nucleic acid amplification or rapid antigen tests for patients with symptoms suspected of having COVID-19[34, 35]. Treating COVID-19 with Paxlovid is recommended in immunocompromised outpatients or patients living in long-term care facilities to prevent hospitalization and death[36].

The IDSA clinical practice guideline for influenza recommends testing for high-risk outpatients such as those who are immunocompromised or presenting with influenza-like illness, pneumonia, or nonspecific respiratory illness using rapid molecular assays (i.e., nucleic acid amplification tests) or reverse-transcription polymerase chain reaction (RT-PCR) over rapid antigen diagnostic tests to improve influenza virus detection[37]. The administration of the antiviral treatment oseltamivir to patients with influenza is recommended as early as symptoms start within the first 48 hours for those at high risk of complications such as infants, young children, and pregnant women[38, 39]. Timely initiation of antiviral treatment for influenza can reduce its severity, and symptoms, shorten illness duration by one or two days, reduce hospitalizations and the risk of developing pneumonia, and also reduce the risk of household transmission[39-41].

For RSV infection, the most commonly used laboratory tests are real-time reverse transcription-polymerase chain reaction (rRT-PCR), and antigen detection tests. rRT-PCR assays should be used when testing older children and adults than antigen testing because these populations have lower viral loads in their respiratory specimens[42, 43]. Treatment is generally supportive in mild cases, however, hospitalization may be required in children with severe illness, those with co-morbidities, and/ or immunocompromised individuals. Treatment with antiviral ribavirin may be administered to immunocompromised individuals with severe illness[42, 43].

1.1.4. Biomarker Approach To Differentiating Acute Respiratory Infections Diseases

C-reactive protein (CRP) is an inflammatory biomarker and can be used as a laboratory or a POC test to differentiate between bacterial and viral RTI as only a minor increase in CRP levels is observed in the second[44, 45]. It is widely used to guide clinical decision-making and antibiotic prescribing for acute RTI in high-income settings[46-50]. Test results can assure healthcare providers that the infection is not severe and an antibiotic is not required for patients presenting with a lower viral RTI and this consequently prevents possible serious illness and the development of complications[51, 52]. In 2014, the NICE released guidelines recommending that point-of-care (POC) CRP testing may be useful to guide antibiotic prescribing for patients without a definitive diagnosis of pneumonia but with symptoms of a lower RTI such as cough, fever, and sputum production [53]. For patients presenting with symptoms of an upper RTI, the CRP value helps reassure a patient that an antibiotic is not required[52].

1.1.5. POC Testing Overview

Traditional laboratory testing is not always feasible. POC testing has revolutionized the way healthcare is delivered. Initially, the first blood glucose strips were originally made available in the 1960s for use in physician's offices not in the home. By the 1980s, the strips were further developed into devices giving patients the ability to monitor their blood glucose levels in the home. These devices enabled access to data outside of the typical laboratory setting and marked the beginning of POC testing in the community pharmacy setting[54]. POC testing is becoming more prevalent in various healthcare settings and new devices are being available to test for numerous health conditions outside the laboratory including respiratory tract infections such as strep, COVID, influenza, RSV, and bacterial pneumonia [55]. POC testing for acute respiratory infectious diseases in Canadian community pharmacies was first studied in 2014[56].

1.1.6. POC Testing Definition

Although no universally accepted definition of POC testing exists, it typically involves performing a robust diagnostic test outside of a laboratory at or near the patient that produces a reliable result rapidly to aid in disease screening, diagnosis, and/or patient monitoring[57-59]. Alberta Health Services defines POC testing as those analytical patient testing activities provided outside the physical facilities of the clinical laboratory that may not require a permanent dedicated space and can be performed by clinical personnel whose primary training is not in the clinical laboratory sciences[60].

1.1.7. POC Testing Advantages

POC testing offers several advantages in comparison to central laboratory testing. It is performed near the patient and has simpler specimen handling, simpler sample requirements, and no transportation required[61, 62]. POC testing is characterized by a fast turnaround time of testing of approximately 5–15 min[61-67]. With POC testing, the screening or diagnostic process can be completed during a single clinical encounter. It is less invasive such as fingerprick testing, a key difference from central laboratory testing[62]. In advanced healthcare systems, POC testing may be advantageous if health or economic benefits can be demonstrated. In resource-poor nations, POC testing may be the only way of delivering advanced testing for epidemiologically important diseases, such as HIV infection[61]. POC testing should not replace central laboratory testing as the gold standard but be utilized in cases where direct positive benefits on patients have been demonstrated [68].

In the United States, POC tests are waived under the Clinical Laboratory Improvement Amendments (CLIA) of 1988. Waived tests include test systems indicated by the FDA for home use and those tests approved for a waiver under the CLIA criteria[69]. Although CLIA-waived tests are simple and have a low risk of erroneous results, they are not completely error-proof. Errors can occur anywhere in the testing process, particularly when the manufacturer's instructions are not followed and when testing personnel are not familiar with all aspects of the test system[69].

1.1.8. POC Testing Technology Tests for Acute Respiratory Infectious Diseases

Under the "ASSURED" acronym the World Health Organization defines six characteristics that every POC test should have: affordable, sensitive (avoid false negative results) and specific (avoid false positive results), user-friendly (simple to perform, non-invasive), rapid and robust, equipment-free, and deliverable (accessible to end-users)[70, 71]. These characteristics enable POC tests to be applied in different settings and achieve high-quality results[72].

While POC tests produce results in a short turnaround time, their sensitivity and specificity may be restricted, potentially leading to false-negative or false-positive results. Consequently, it is imperative for clinicians to appropriately use and accurately interpret these results[73]. For example, when using POC testing in the context of influenza, it is recommended to collect specimens early after the illness onset, follow manufacturers' recommendations, and follow up negative results with confirmatory tests if a laboratory diagnosis is mandated, to minimize false results[74].

POC tests include rapid antigen tests and nucleic acid tests. Rapid antigen tests are those that detect specific protein antigens on the surface of the pathogen. Nucleic acid tests also referred to as "molecular testing" (and sometimes called PCR testing) detect the pathogen genetic material (i.e., nucleic acids)[75]. Mostly these tests are single-run tests, but some platforms allow for sequential testing of two pathogens based on one swab [76]. Additionally, POC biomarker tests include C-reactive protein testing where a capillary blood sample is taken for the test through a finger-prick.

1.1.9. Performance of POC Tests for Acute Respiratory Infectious Diseases

Table 1.1. summarizes the performance characteristics of POC tests for respiratory infectious diseases. Regarding strep throat testing, three systematic reviews of 43 to 98 studies including 18,464 to 101,121 patients assessed rapid antigen detection tests versus culture[67, 77, 78]. The sensitivity and specificity were consistently about 85% and 95%. The positive likelihood ratio (LR+) was 16.8 and the negative likelihood ratio (LR−) was 0.16[67, 77, 78]. In 1 systematic review including 6 studies of 1937 patients, nucleic acid detection tests versus culture detected a sensitivity and specificity of 92% and 99%, respectively, LR+ was 92, and LR− was 0.08[78]. Similar evidence was published after the above reviews and reported a sensitivity of 98% and specificity of 93%-98% for the cobas Liat Strep A and the Alere I Strep A rapid molecular asssays[79, 80]. This demonstrates the higher performance characteristics of molecular POC tests in comparison to rapid antigen detection tests.

The Infectious Disease Society of America identified 65 studies that evaluated the diagnostic accuracy of COVID-19 rapid antigen testing as compared to Nucleic acid amplification tests (NAAT) in symptomatic individuals (20,272 patients). The pooled sensitivity was 81% (95% CI: 78% to 84%) and the pooled specificity was 100% (95% CI: 100 to 100)[34]. Regarding the molecular assay (NAAT), the pooled sensitivity and specificity in five studies in comparison to a composite of more than two standard NAATs (i.e., rapid RT-PCR and laboratory-based NAAT) were 97% (95% CI: 93 to 99) and 100% (95% CI: 96 to 100)[35].

In terms of influenza testing, a systematic review of the performance characteristics of these tests in comparison to the real-time reverse-transcription polymerase chain reaction (RT-PCR) was conducted[81]. Two studies assessed the BD Veritor system (rapid antigen test). The sensitivities ranged from 90.2%-93.8% for influenza A and 87.5%-94.2% for influenza B, and the specificities ranged from 97.9%-99.07% for influenza A and 100% for influenza B. In a third study, the sensitivities were moderate 72% for influenza A, 69.3% for influenza B, and 100% specificity for both. Seven studies included the Sofia influenza A+ B FIA (rapid antigen test). The sensitivities ranged from 71%-95% for influenza A, 33%-98% for influenza B, and more than 90% specificity for influenza A. Six studies examined the Alere I (molecular assay). The Sensitivities were 73%-99% for influenza A and 45%-100% for influenza B. The specificities in five studies were over 98% for influenza A and B except for one study the specificity was 62.5% for influenza A and 53.6% for influenza B[81]. In another study, the overall sensitivity and specificity of the Alere i Influenza A&B Nucleic Acid Amplification Test in comparison to ProFlu+ real-time RT-PCR were 88.8% and 98.3% for detecting influenza A and 100% and 100% for detecting influenza B virus[82].

There exist several CRP POC test analyzers with considerably varied performance characteristics[83, 84]. One example is the Alere Afinion™ AS100 Analyzer[85]. This device demonstrated adequate analytical performance in validation studies compared to the reference methods (e.g., laboratory standard), and was deemed user-friendly and portable[84, 86, 87]. In another study, the QuikRead CRP analyzer was compared to the reference laboratory standard for adult patients presenting with lower respiratory tract symptoms[88]. It showed a performance of 92.2% for sensitivity, and 99.4% for specificity[88]. Therefore, it is deemed a good choice for CRP testing in primary care[88].

A systematic review evaluated RSV rapid antigen tests compared to a reference standard (reverse transcriptase PCR [RT-PCR], immunofluorescence, or viral culture). The combined sensitivity and specificity were 80% (95% confidence interval [CI], 76% to 83%) and 97% (95%

CI, 96% to 98%). Positive- and negative-likelihood ratios were 25.5 (95% CI, 18.3 to 35.5) and 0.21 (95% CI, 0.18 to 0.24), respectively[89].

Table 1.1. Summary of POC Tests Performance Characteristics for Different Disease States.

Condition	**Test Type**	**Sensitivity**	**Specificity**	**Positive Likelihood Ratio (LR+)**	**Negative Likelihood Ratio (LR−)**	**References**
Strep Throat	Rapid Antigen Detection Tests	85%	95%	16.8	0.16	[67, 77, 78]
Strep Throat	Nucleic Acid Detection Tests	92%	99%	92	0.08	[78]
Strep Throat	cobas Liat Strep A and Alere I Strep A (rapid molecular assays)	98%	93%-98%	Not specified	Not specified	[79, 80]
COVID-19	Rapid Antigen Testing	81% (95% CI: 78%-84%)	100% (95% CI: 100%-100%)	Not specified	Not specified	[34]
COVID-19	Molecular Assay (NAAT)	97% (95% CI: 93%-99%)	100% (95% CI: 96%-100%)	Not specified	Not specified	[35]
Influenza	BD Veritor System (rapid antigen test)	90.2%-93.8% (Influenza A), 87.5%-94.2% (Influenza B)	97.9%-99.07% (Influenza A), 100% (Influenza B)	Not specified	Not specified	[81]
Influenza	Sofia Influenza A+B FIA (rapid antigen test)	71%-95% (Influenza A), 33%-98% (Influenza B)	>90% (Influenza A), Not specified (Influenza B)	Not specified	Not specified	[81]

Condition	Test Type	Sensitivity	Specificity	Positive Likelihood Ratio (LR+)	Negative Likelihood Ratio (LR−)	References
Influenza	Alere I (molecular assay)	73%-99% (Influenza A), 45%-100% (Influenza B)	>98% (Influenza A and B, except for one study: 62.5% for Influenza A, 53.6% for Influenza B)	Not specified	Not specified	[81]
Influenza	Alere i Influenza A&B Nucleic Acid Amplification Test	88.8% (Influenza A), 100% (Influenza B)	98.3% (Influenza A), 100% (Influenza B)	Not specified	Not specified	[82]
CRP Testing	Alere Afinion™ AS100 Analyzer	Adequate	Adequate	Not specified	Not specified	[84, 85, 86, 87]
CRP Testing	QuikRead CRP Analyzer	92.2%	99.4%	Not specified	Not specified	[88]
RSV	Rapid Antigen Detection Tests	80% (95% CI: 76%-83%)	97% (95% CI: 96%-98%)	25.5 (95% CI: 18.3-35.5)	0.21 (95% CI: 0.18-0.24)	[89]

1.1.10. Clinical Use of POC Testing for Respiratory Infectious Diseases in Primary Care

There has been great interest in using rapid antigen diagnostic tests (RADTs) for the detection of respiratory infectious diseases as alternatives to traditional laboratory testing, by primary care physicians. For example, in a randomized controlled trial in Spain to identify group A streptococcus in acute pharyngitis on the utilization of antibiotics and appropriateness of their use, physicians without access to RADTs (control arm) were more likely to prescribe antibiotics compared to those who performed RADTs (intervention arm)[90]. Inappropriate antibiotic prescribing was observed in 226 cases (43%) and was significantly greater in the control than in the intervention group (60% versus 26.9%; P<0.001)[90].

Shulman et al. published an updated Clinical Practice Guideline for the Diagnosis and Management of Group A Streptococcal Pharyngitis in primary care that recommends taking a throat swab and performing rapid antigen testing and/or throat culture for adults without the need to perform a back-up throat culture because the probability of GAS pharyngitis in adults is low[22]. Furthermore, Positive RADTs do not require a backup throat culture because the tests are highly specific. In children and adolescents, negative RADT tests should be backed up by a throat culture because the likelihood of GAS pharyngitis in this age group remains high, particularly in areas where the burden of acute rheumatic fever is high [22, 91].

A mixed methods multi-site cohort study assessed the impact of integrating molecular POC testing (i.e., Abbott ID NOW) for influenza into primary care on patients' clinical outcomes[92]. Regarding a positive influenza result, the odds ratio of receiving an antiviral was 14.1 (95% CI = 2.9 to 70.0, P<0.001), and of receiving an antibiotic was 0.4 (95% CI = 0.2 to 0.8, P = 0.01), compared with patients with a negative result. Findings from qualitative analysis deemed the feasibility of incorporating POC testing for influenza in primary care settings[92].

A Cochrane systematic review was conducted to assess the benefits of CRP POC testing in patients presenting with respiratory tract symptoms in primary care settings[51]. In 12 clinical trials, CRP POC testing significantly reduced antibiotic use compared to standard care. Based on the available evidence, the findings suggest using it as an adjunct to standard care to reduce the prescription of antibiotics in primary care patients presenting with respiratory tract symptoms [51].

1.2. Pharmacists Bridging the Gap in Healthcare

Patients deserve high-quality and accessible healthcare services. However, in 2019, Statistics Canada[93] reported that approximately 4.6 million Canadians aged 12 and over did not have regular access to a primary care provider. Significantly more males (17.4%) than females (11.7%) reported they were without a regular healthcare provider in 2019. Among both males and females, compared to all age groups, those aged 18 to 34 were the most likely to lack a regular healthcare provider. In contrast, Canadians aged 65 and older were the least likely (6.0% for males and 5.5% for females). This shortage is even more acute in rural settings where only 8% of physicians are located[94]. Primary care serves as the initial point of contact within the healthcare system, however, almost 20% of people living in Canada lacked a primary care provider at the beginning of the pandemic[95]. Canada is behind other affluent countries in terms of access to primary care. For example, in countries such as the United Kingdom, Norway, the Netherlands, and Finland, over 95 percent of individuals have a designated primary care provider or facility[95]. Conversely, in Canada, a considerable number of individuals endure lengthy wait times before securing an appointment with a general practitioner (GP)[96].

Several novel approaches are currently being devised in Canada to improve access to care, with one focussing on healthcare provision by community pharmacists operating within their full scope of practice. Community pharmacists in Canada are the most accessible healthcare providers[97]. Community pharmacists can contribute to achieving the triple aim framework of improving the experience of patients' care, improving the health of populations, and reducing per capita costs of healthcare[98].

During the COVID-19 pandemic, community pharmacists demonstrated an ability to meet patients' needs for high-quality and accessible health care. For example, they played an important role in administering vaccinations, conducting asymptomatic testing, distributing POC COVID-19 tests, and renewing certain drug prescriptions.

The expansion of community pharmacists' scope of practice contributes to primary healthcare reform in Canada[99]. Furthermore, it may foster interdisciplinary pharmacist-general practitioner collaboration because as per the expanded scope, some of the services are provided through a formal partnership with local primary care clinics or independently within a pharmacy, then subsequently communicated to the patient's physician or nurse practitioner[99]. The broadened scope of practice aims to mitigate the strain on the healthcare system without taking over the role of physicians. Additionally, it also reduces the time spent by general practitioners on managing minor ailments enabling them to focus on more complex conditions and consequently reducing patients' wait times[100].

1.2.1. Community Pharmacists' Scope of Practice in Canada

Health care delivery in Canada is primarily overseen by the provincial/territorial governments. As a result, the structure of health care varies across jurisdictions[99, 101]. Historically, the main emphasis of community pharmacists' practice has been on guaranteeing the accessibility of over-the-counter and prescription medications in a safe and convenient manner. This includes assessing the appropriateness of prescriptions, educating patients about the medications and disease states prior to dispensing the prescriptions, monitoring the efficacy and safety of prescription medications, prompting patients' involvement in self-management through non-pharmacologic approaches, and making appropriate referrals to other healthcare providers when necessary [99]. Over the past ten years, legislation supporting a wider scope of practice for pharmacists has been approved by the majority of Canadian provinces[102, 103].

An expanded scope of practice may empower pharmacists to help alleviate the load on primary care physicians and hospitals through the provision of critical services patients can access conveniently[104]. Alberta has been a leader regarding the expanded scope of practice. Since 2007, all pharmacists can prescribe to adapt existing prescriptions and may apply for additional prescribing authorization (APA). This authorization allows them to independently select, initiate, modify, and monitor a wide range of prescription drugs, except for narcotics and controlled substances[105]. Around 60% of Alberta pharmacists have APA[106]. Community pharmacists in different provinces have not achieved the extensive prescribing authority that Alberta pharmacists have[107].

Community pharmacists can provide medication reviews as a means to enhance patients' comprehension of their prescribed drugs, as well as offer guidance on smoking cessation and tobacco use. Community pharmacists can adapt or manage a prescription such as making a therapeutic substitution or extending a prescription for continuity of care. Community pharmacists have also been involved in the management of minor ailments. For example, they can assess and prescribe for conditions such as uncomplicated urinary tract infections, allergic rhinitis, and influenza. The management of minor ailments by pharmacists may result in significant savings in healthcare costs[106, 108].

Furthermore, community pharmacists can inject drugs and vaccines such as the seasonal influenza vaccine and COVID-19 booster doses. They can also order and interpret laboratory tests [107] and perform point-of-care testing. They can access Alberta Netcare, a provincial electronic health record, to check medication and lab information. Community pharmacists may consider laboratory data in determining the safety and efficacy of treatment regimens, evaluating the response to therapy, and screening patients for additional comorbidities in untreated health conditions[109]. Additionally, The involvement of pharmacists in laboratory testing has the potential to enhance patient outcomes through the facilitation of prescribing[110]. Finally, a framework is in place to support compensation for clinical pharmacy services including comprehensive annual care plans (CACP), standardized medication management assessments (SMMA), and assessment for prescribing[111].

1.2.2. POC Testing in Community Pharmacies

As part of the new and expanded primary care services offered within community pharmacies, community pharmacists are increasingly meeting patients' needs in the detection or screening of acute and chronic health conditions using POC testing. For chronic disease management, they encompass the utilization of POC testing for fasting blood glucose (FBG), hemoglobin A1c (A1C), lipids, renal function, and international normalized ratio (INR). They can be used to screen for chronic infectious diseases (e.g., HIV and Hepatitis C). As for the screening of acute respiratory infectious diseases, they involve the use of POC testing for strep throat, influenza, COVID-19, and C-reactive protein. There are several issues regarding the implementation of POC testing in community pharmacies, including regulatory requirements, test performance characteristics, and evidence to show these services improve patient outcomes and are feasible. Other key concerns include fragmentation of care delivery, pharmacists' willingness to perform additional services, as well as the inability to make an accurate decision regarding the interpretation of the test results[112].

1.2.3. POC Testing Requirements in Community Pharmacies

Given the expanding scope of practice, community pharmacists in many jurisdictions have been involved in conducting POC testing for various acute and chronic conditions. Each country has its national regulations that state the legal requirements for establishing a POC testing program in community pharmacies. In the United States, all settings that perform laboratory testing on human specimens for the purposes of health assessment, diagnosis, prevention, or treatment of disease, including all POC tests, are regulated by the Centers for Medicare and Medicaid Services (CMS) through CLIA[113]. Community pharmacies that conduct CLIA-waived tests are considered laboratories. Hence, before offering POC testing services, pharmacists must obtain necessary waivers and licenses mandated by state and federal regulations, and these regulations vary from state to state[114, 115]. The FDA reviews requests for a CLIA Certificate of Waiver by Application[116]. Pharmacists also must enter into a collaborative practice agreement with physicians to establish a POC testing program[114, 115]. Established relationships between pharmacists and physician partners support interprofessional collaboration for POC services in community pharmacies[114].

The COVID-19 pandemic has positively impacted CLIA-waived testing in community pharmacies as a means to meet patients' demand for testing and to control the spread of the virus[117]. As a response to the pandemic, the U.S. Department of Health and Human Services (HHS) authorized licensed pharmacists to order and administer FDA-authorized SARS-COV-2 tests including both diagnostic and antibody tests[118]. States have also rapidly expanded CLIA-waived testing through both legislative and executive action to increase the capacity of providers and availability of diagnostic testing for COVID-19[119, 120]. In turn, the number of CLIA-waived community pharmacies increased by 45% (from 10 626 to 15 671) from 2015 to 2020, becoming the second-largest provider in the United States[117, 121].

Canada does not have a consistent scope of practice among all provinces, and before COVID-19, seven out of 10 provinces enabled POC testing implementation[122]. Provincial governmental bodies work together with Provincial regulatory authorities (PRAs), also referred to as Colleges, to develop regulations that are suitable for the province's requirements [122]. For example, the Alberta College of Pharmacy has published practice standards and guidelines to guide community pharmacists when ordering and interpreting lab testing and performing POC testing[123]. Moreover, the British Columbia Ministry of Health has prepared a policy to guide the appropriate implementation of POC testing by community-based health-care providers that fall outside the laboratory accreditation authority such as those provided in a clinic, physician's office, pharmacy, or long-term care facility outside of a health authority[124].

These documents ensure that professionals understand the devices’ performance characteristics, assess the test suitability in order not to prevent test duplication, ensure the testing environment allows for privacy and infection control measures, and that professionals use clinical decision-making to decide if the test is appropriate for the intended purpose and if a laboratory test may be more suitable[122-125].

1.2.4. Performance Characteristics of POC Testing in Community Pharmacy

It is essential that tests meet acceptable standards of accuracy in the setting they are used in. The best evidence regarding the performance characteristics of POC testing performed in community pharmacies comes from the review published by Buss et al. in 2019[126]. This was a systematic review to assess the effectiveness and analytical qualities of POC tests for screening or diagnostic purposes conducted in community pharmacies in comparison to other healthcare settings or the laboratory reference standard[72]. It included studies focused on blood glucose, cholesterol, bone mineral density, creatinine, uric acid, liver enzymes, and HIV. They found that the tests used had satisfactory analytic quality and that pharmacies are well suited to offer various screening and diagnostic POC tests[72]. While the performance characteristics of POC testing for acute respiratory infectious diseases are relatively favorable, there is a lack of data on their performance characteristics within the community pharmacy setting.

1.2.5. Evidence for POC Testing in Community Pharmacy

Several research projects have been published exploring the feasibility of implementing POC testing in community pharmacies. For example, in 2020 Albasri et al.[127] published a systematic review and meta-analysis to evaluate the clinical implications of POC tests in community pharmacies on clinical outcomes and healthcare processes. The meta-analyses included a total of thirteen studies, which encompassed four therapeutic areas: targeted anti-malarial therapy, A1C in diabetes, lipid control, and INR control in patients taking warfarin. They concluded that POC testing had some benefits on surrogate outcomes for these conditions, but that few used gold standard randomized controlled trial (RCT) designs, and further RCTs are necessary to determine the clinical utility of POC testing for new services, particularly upper respiratory tract infections. Further, there are several examples exploring pharmacist POC testing for HIV, Hepatitis C, and other conditions[128-131].

Focussing on respiratory tract infection, POC testing has the potential to improve access to care, pharmacists-physician collaboration, and clinical decision-making by differentiating between viral and bacterial pathogens, subsequently reducing unnecessary antibiotic prescribing, and contributing to antimicrobial stewardship[132-135].

Despite the lack of validation of POC testing for strep, COVID-19, or influenza in community pharmacies, several pilot projects have demonstrated that the application of POC testing for acute respiratory infectious diseases in community pharmacies is promising.

Starting with strep throat, a retrospective observational study to evaluate the effects and feasibility of community pharmacist-directed GAS testing was conducted at 204 Shoppers Drug

Mart pharmacies in the Canadian provinces of Alberta, British Columbia, and Nova Scotia [136]. This project evaluated the proportion of patients who tested positive for GAS resulting in the same time initiation of therapy and assessed patient satisfaction with the service. Of the total patients tested, 25.5% were positive, and 68.7% were prescribed antibiotics on the same day. In Alberta, where pharmacists have advanced prescribing authority, the rate of initiating therapy on the same day was found to be 73.8%, in contrast to a rate of 40.5% ($P < 0.05$) in other jurisdictions[136]. Although patients paid out of pocket for the test, 81% were either very satisfied or somewhat satisfied with receiving a GAS test at the pharmacy. Furthermore, 93% were willing to use the service again in the future particularly because of service speed and efficiency[136].

In the UK, Thornley et al. evaluated the feasibility of screening and treatment of GAS pharyngitis in community pharmacies[137]. Trained pharmacy staff used a test-and-treat approach where a Centor Scoring system was offered and patients meeting the criteria were offered a POC strep throat test. Then, positive patients were prescribed an antibiotic. POC testing was deemed feasible in this study, and less than half of the patients (48.8%) would have gone to their GPs if the service had not been available[137]. Another sore throat test and treat service (STTT) funded by the National Health Service was conducted in two local health boards in Wales, UK[138]. The STTT improved the diagnostic confidence of strep throat and was associated with greater reductions in the prescriptions for phenoxymethylpenicillin than in areas where STTT was not available (−3.8% and −3.4%, difference 0.4%)[138].

For COVID, In response to the COVID-19 pandemic, the US Department of Health and Human Services (DHHS) issued guidance through the Public Readiness and Emergency Preparedness (PREP) Act authorizing licensed pharmacists to order and administer COVID-19 diagnostic tests in the United States[139]. On April 28th, 2020, a subsequent cross-sectional survey study was carried out to examine the inclination of Idaho pharmacists to offer COVID-19 POC testing and evaluate their perceptions regarding the necessary resources to provide such services[70]. The majority of participants (70%) expressed their willingness to conduct COVID-19 testing. The primary barriers mentioned in contributing to the COVID-19 testing were identified as adequate staffing, adjustments in workflow, and the availability of billing and reimbursement mechanisms.[140].

For influenza, in a prospective multicenter cohort study conducted in three states in the US, community pharmacists performed assessment and screening for adults presenting with influenza-like symptoms using a rapid influenza diagnostic test, then provided referral or treatment with oseltamivir according to an established protocol and a collaborative practice agreement with a licensed healthcare provider[141]. Of the 75 patients eligible for inclusion in the study, 8 (11%) had a positive test result and were prescribed oseltamivir. Negative patients were offered over-the-counter treatment. Of the patients tested, 34.6% had no primary care physician and 38.7% visited the pharmacy outside of normal office hours which highlights the improved access to care. The study revealed that by employing an evidence-based collaborative practice agreement, community pharmacists were capable of delivering timely care to patients with and without influenza regardless of whether they have a primary care physician or not[141].

In a feasibility study, Papastergiou et al. assessed the impact of influenza screening in community pharmacies where patients were recruited and screened for influenza using a rapid antigen detection test at 2 Shoppers Drug Mart located in Toronto, Ontario[142]. A total of 59 patients were screened of which 20 patients were positive for influenza, and a prescription for oseltamivir was obtained by a general practitioner for eight patients in the study. The study showed that it is feasible to deliver influenza screening in community pharmacies and that pharmacists can play a significant role in providing screening and improving prompt access to influenza therapy. However, timely physician communication for obtaining prescriptions for some patients was cited as a barrier in this study[142]. Using influenza testing may represent a promising way to curb overall influenza-related healthcare costs and improve the proper utilization of antiviral medications[143].

In a retrospective cohort study, clinical encounters of patients with influenza visiting inpatient, ambulatory/outpatient, and emergency room settings were identified using claims data from a midwestern commercial health insurance plan. Patients who had undergone an influenza RADT received antiviral treatment in 27.5% of the cases compared with 55% for patients with no influenza RADT. Furthermore, occurrences with a medical visit and a RADT showed a statistically substantial ($P < 0.001$) decreased median 30-day healthcare expenses related to influenza (\$62.46) compared to occurrences with a medical visit but without RADT (\$192.83). Therefore, further studies exploring this impact in community pharmacies should be sought[143].

Similarly, CRP POC testing has been explored in the community pharmacy setting. Cooke et al. were the first to conduct a pilot study that evaluated the potential utilization of CRP POC testing in 40 patients with respiratory tract infections (RTIs) in a rural community pharmacy in North Staffordshire, UK, in collaboration with local GP practices[144]. Following the administration of the CRP test, six patients were referred to the GP surgery, five individuals were categorized as "watch and wait," and thirty-three were advised to practice self-care. Among the "watch and wait" and self-care patients (n=38), none of them necessitated subsequent GP referral. In general, 95% of patients who underwent the POC CRP test expressed that they would have otherwise sought consultation from the GP and anticipated being prescribed antibiotics. The observation of a low CRP test outcome served as a reassurance for the patient, confirming that the ailment is self-limiting and more likely to resolve on its own[144].

Subsequently, a larger prospective, pilot study conducted in Western Australia examined the use of CRP point-of-care testing in community pharmacies to support the management of respiratory tract infections in 131 patients[64]. Community pharmacists performed clinical assessments of patients based on a guideline-driven protocol and then performed the POC testing. The study determined that POC testing for CRP is feasible and a viable strategy to enhance community pharmacists' management of respiratory tract infections. Moreover, the study involved a survey to gauge patients' perceptions about the service, in which more than half of the participants (58/114, 50.9%) changed their perceptions on the necessity of antibiotics which was reflected in statements regarding the enhancement of public awareness through CRP testing, the reduction of inappropriate antibiotic usage, and the decrease in unnecessary visits to general practitioners or hospitals[135]. A subsequent qualitative study was conducted in order to evaluate community pharmacists' views on the adoption of the service[145]. The testing was found to be simple, rapid, reliable, and accurate, thereby improving their clinical decision-making, and promoting the responsible use of antibiotics. The availability and trustworthiness of pharmacists were identified as significant factors that facilitated the provision and acceptance of the service by consumers.[145].

There are no studies of community pharmacy-based RSV testing.

1.3. Implementation Science

New research findings can contribute to effective and efficient healthcare, but research findings can not imply a change unless implemented by healthcare providers[146]. The field of implementation science has emerged to facilitate innovations' implementation in practice[146-149]. Implementation research is the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice to improve the uptake, quality, and effectiveness of health services[146]. It involves the study of the influences of healthcare professionals and organizational behavior[146].

Implementation is the process of beginning to use and incorporating innovations within a setting[150]. It is characterized by being a non-linear, iterative, and complex process that consists of multiple stages[151-153]. Within each implementation stage, three main aspects should be considered which are the determinants of implementation (e.g., enablers and barriers), strategies to address these determinants (e.g., training), and evaluations as a means of assessing the implementation process[154]. The six stages of implementation are Development or Discovery, Exploration, Preparation, Testing, Operation, and Sustainability[154]. The innovation to be implemented, the implementation stages, and the context in which an innovation is to occur are grouped in a framework called the Generic Implementation Framework[148].

The field of implementation research has been evolving in recent years, and new implementation frameworks have been developed to fit multiple disciplines[148, 150, 155, 156]. However, studies using implementation theories and/or frameworks to inform their implementation are few, particularly in the pharmacy field[157, 158]. Numerous implementation theories, which are documented in the literature, can facilitate the process of implementation. Despite the presence of a degree of overlap among these theories, individual ones may exhibit deficiencies due to the absence of one or more constructs found in others[155]. Contrary, implementation frameworks consolidate constructs from multiple individual theories and can facilitate the identification and understanding of the various potentially relevant constructs and how they may apply in a particular context[155]. Understanding the implementation process, in conjunction with the utilization of an implementation framework may facilitate the widespread implementation, adoption, sustainability, and scalability of innovations[154]. Moulin et al. conducted a systematic review to help in the comparison and selection of implementation frameworks for use in the healthcare field[148].

The Consolidated Framework for Implementation Research (CFIR) is an example of a multi-level, descriptive implementation framework that unifies key constructs from 19 published implementation theories including Everett Rogers' Diffusion of Innovations Theory and Greenhalgh and colleagues' compilation based on their review of 500 published sources across 13 scientific disciplines[155, 159]. Implementation factors are organized under five domains: Intervention characteristics, Inner setting, Outer setting, Characteristics of individuals, and the Implementation process. Each domain contains several individual constructs for a total of 39 constructs for the five domains[155]. It aims to provide a pragmatic and comprehensive framework for the implementation of research findings into practice and to guide and describe the implementation process[155]. Furthermore, it considers implementation factors (i.e., enablers and barriers) not only at the individual level but also at the organizational and broader societal levels[155].

The theoretical domains framework (TDF) is another routinely used implementation determinant framework that comprises 128 constructs in 12 domains derived from 33 behavior change theories[160-162]. TDF domains include knowledge (e.g., of the scientific rationale for implementation); skills (e.g., ability); social/ professional role and identity (e.g., group norms); beliefs about capabilities (e.g., self-efficacy); beliefs about consequences (e.g., outcome expectancies); motivation and goals (e.g., intention); memory, attention, and decision processes (e.g., attention control); environmental context and resources (e.g., resources); social influences (e.g., leadership); emotion (e.g., burnout); behavioral regulation (e.g., feedback); and nature of the behavior (e.g., routine)[161, 162]. Both the CFIR and TDF are multi-level implementation determinant frameworks that can be used to identify the influences and determinants of individual and organizational behavior in the context of the implementation process[163]. However, it has been argued that the TDF focuses more on influences related to the individual healthcare provider behavior though it also includes organizational-level constructs[164, 165].

1.4. Thesis Problem Statement

There is a growing body of evidence suggesting that the utilization of POC testing for various acute respiratory infectious diseases, such as strep throat, influenza, C-reactive protein, and COVID-19, within community pharmacies, is feasible, safe, effective, and offers numerous advantages in patient accessibility and convenience, yet its uptake is not widespread. Extensive descriptive and observational research has demonstrated the feasibility and potential benefits of this innovation in community pharmacies. Nevertheless, the uptake is countered by several barriers that hinder implementation on a broader level. The sustainability of POC testing for acute respiratory infectious diseases in community pharmacies is influenced by a wide range of implementation factors, including both facilitators and barriers. The COVID-19 pandemic where many community pharmacies in Canada offered asymptomatic COVID-19 testing to patients, seems to have increased the pace of POC testing implementation in community pharmacies. Being aware of the implementation factors discussed in the current pharmacy literature can assist in selecting strategies that facilitate the successful implementation of this service in community pharmacies in Canada. Thus, a theory-informed review to guide the implementation of POC testing for acute respiratory infectious diseases in community pharmacies is mandated.

Additionally, given that there is an uptake of POC testing services within community pharmacies in Canada there is a research gap concerning community pharmacists' perspectives on providing this service in community pharmacies in Canada, as well as the various types of POC tests currently administered in their practice sites.

1.5. Goal and Objectives of Thesis

1.5.1. Goal

The overall goal of this thesis is to improve the quality of patient care provided by community pharmacists by exploring the adoption of POC testing for acute respiratory infectious diseases in community pharmacies. The research conducted in this thesis aims to identify existing needs and gaps and provide insights to guide the development of future studies on the implementation of POC testing for acute respiratory infectious diseases in community pharmacies.

1.5.2. Objectives

In support of this goal, we conducted two projects to address the following objectives:

1. Summarize the extent, range, and nature of research available on enablers and barriers of POC testing implementation for acute respiratory infectious diseases by pharmacists in community pharmacies and identify gaps for future research.
2. Explore community pharmacists' experiences, attitudes, and confidence in offering POC "test and treat" services for acute upper respiratory tract infections in community pharmacies in Alberta, Canada.

1.6. Thesis Outline

The outline of this thesis is as follows:

Chapter one aims to provide a literature review of the research topic being studied, setting the problem statement, goals, and objectives, and presenting an outline of each included chapter.

Chapter two provides detailed steps of a theory-informed scoping review conducted on contemporary research published on POC testing for acute respiratory infectious diseases in community pharmacies.

Chapter three presents an online quantitative cross-sectional study that explores community pharmacists' experiences, attitudes, and confidence in offering POC “test and treat” services for acute upper respiratory tract infections in community pharmacies in Alberta.

Chapter four summarizes the research presented in this thesis, presents implications of the findings, thesis strengths, and limitations, and provides an overall conclusion.

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2. Chapter 2. Scoping Review

Factors Influencing Implementation of Point-of-care Testing for Acute Respiratory Infectious Diseases in Community Pharmacies: A Scoping Review Using the Consolidated Framework for Implementation Research

Authors

Omar E. Abdellatife, BScPharm[1]

Mark J. Makowsky, BSP, PharmD[1]

Affiliations

1. Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta, Edmonton, Alberta, Canada T6G 1C9.

Corresponding Author

Mark J. Makowsky, 2-142E Katz Group- Rexall Centre for Pharmacy & Health Research 11361 87 Avenue, Edmonton, Alberta, T6G 2E1, Canada; Tel.: 780.492.1735; Fax: 780.492.1217; E-mail: makowsky@ualberta.ca

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ABSTRACT

Background: Emerging evidence suggests pharmacy-based point-of-care (POC) testing for acute respiratory infectious diseases is beneficial, but not widely implemented. A theory-informed review to understand the factors influencing service implementation is lacking.

Objective: To examine the extent, range, and nature of research available on enablers and barriers to POC testing implementation for infectious respiratory diseases in community pharmacies and identify their underpinning theoretical constructs using the Consolidated Framework for Implementation Research (CFIR).

Methods: Scoping review guided by the JBI Manual for Evidence Synthesis. A comprehensive search from inception to June 28th, 2022 was conducted using Medline, Embase, CINAHL, Cochrane Library, and ProQuest dissertations without date or language restriction. Eligible articles investigated barriers and/or facilitators to strep throat, influenza, C-reactive protein, and COVID-19 POC testing in community pharmacies. Two reviewers independently performed title & abstract screening, full-text screening, and data extraction. Content analysis was conducted according to a pre-established framework and concepts were mapped to the CFIR.

Results: Forty-three studies were included. Most originated from the USA (n=24; 56%) and investigated strep throat. The majority were testing/initial implementation projects (n=23; 54%) conducted in urban centers (n=17; 40%). Thirty-six (84%) studies used quantitative methodology, while 6 (14%) were qualitative. Only four studies (9%) used theory to guide their inquiry. The 124 identified implementation factors mapped onto 21 CFIR constructs, covering all 5 domains. The domain "Outer setting" (n=35/43; 81%) was most prevalent as were the constructs "Patient needs and resources," (n=21/43; 49%) "External policy & incentives," (n=17/43; 40%) and "Relative advantage" (n=17/43; 40%).

Conclusion*:* A large volume of research explores factors influencing the implementation of pharmacy-based respiratory infectious disease POC testing services, but few studies use qualitative or theory-informed methods. Knowledge of the wide range of facilitators and barriers identified can help pharmacy managers and researchers design strategies to support successful service implementation.

2.1. Introduction

A strong primary care system underpins the foundation for population health[1, 2]. As providers of care at a patient's first point of contact with the health system, pharmacists are an integral part of the primary health care system[3]. Canada's primary health care system faces several challenges, most acutely a shortage of family physicians. In 2021, Statistics Canada indicated that approximately 4.7 million (14.4%) of Canadians aged ≥12 years, lacked regular access to a primary care provider[4]. These problems are even more acute in rural settings where only 8% of physicians are located[5]. Community pharmacies are known to be convenient and accessible. With 30 pharmacies per 100,000 Canadians, they serve as the first point of contact for many patients[6]. Pharmacists can assist in achieving the Institute of Health Improvement Triple aim of better care, experience, and cost effectiveness[7].

In many jurisdictions, pharmacist scope of practice has expanded to allow pharmacists to assess and prescribe treatment for the management of minor ailments. In some conditions, point-of-care (POC) testing is used to ensure delivery of appropriate treatment. This includes, for example, acute infectious respiratory diseases such as strep throat and influenza[8]. Several Canadian pharmacy chains are offering services which are similar to the "retail clinics" model in the USA but run by pharmacists, not nurse practitioners. These common infections are responsible for many ambulatory care visits in Canada and the USA. For example, Strep pharyngitis leads to an estimated 11 to 13 million ambulatory care visits annually in the United States[9, 10]. Influenza caused 12,200 hospitalizations and 3,500 deaths in Canada annually prior to the COVID-19 pandemic[11]. The course of both conditions can be affected if the disease is identified early and appropriate therapy is initiated[12]. Notably however, both of these illnesses cannot be dependably identified solely upon signs and symptoms, and failure to systematically base decisions on objective information can result in overuse of antimicrobials[13, 14]. Therefore, treatment decisions should be guided by the application of appropriate diagnostic tests including those delivered at the point-of-care[15]. Although no universally accepted definition of POC testing exists, it typically involves performing a robust diagnostic test outside of a laboratory, at or near the patient, that produces a reliable result rapidly to aid in disease screening, diagnosis, and/or patient monitoring[16-18]. For example, rapid antigen detection tests (RADTs) can obtain results within 10-15 minutes[19, 20]. In the USA, POC tests are waived under the Clinical Laboratory Improvement Amendments (CLIA) of 1988. CLIA-waived tests are simple and have a low risk of erroneous results[21]. In Canada there is no regulatory oversight of POC testing.

Evidence suggests that pharmacist care services that include POC testing can improve access and quality of care[22]. Several research projects have demonstrated the feasibility of implementing POC testing for acute respiratory diseases in community pharmacies[22-25]. Those programs have shown the potential to reduce unnecessary antibiotic use, reduce unnecessary GP visits[25, 26], improve pharmacist-physician collaboration[27], and aid in clinical decision-making[28]. From a patient experience perspective, these services have the potential to enhance patient access to healthcare[29]. Historically, there has been slow/limited implementation of these services in community pharmacies in Canada. However, during the COVID-19 pandemic, many pharmacists played important roles in offering asymptomatic COVID-19 testing using rapid antigen detection tests. This has changed the community pharmacy POC testing landscape and the pace of implementation of acute respiratory infectious disease services post-pandemic has increased.

Awareness of implementation factors, which encompass both barriers and facilitators, reported in the contemporary pharmacy literature can help support the successful implementation of POC testing-based services. Previous reviews of implementation factors for novel patient care services in community pharmacy exist. However, none have systematically summarized the available literature, nor used Implementation Science approaches and theory to organize identified barriers and facilitators. For example, In 2014, Gubbins et al. conducted a narrative review of the opportunities and barriers associated with the implementation of POC testing for infectious diseases within community pharmacies[8]. The review highlighted two impediments, namely the regulatory variability and indistinctness regarding pharmacists' scope of practice across different states in the USA, and the inadequacy of training. While three separate theory-informed reviews have studied implementation factors for novel/professional pharmacy services, none specifically focus on the identification of barriers and facilitators for acute respiratory infectious disease services in community pharmacies[30-32]. Implementation science offers a framework to systematically study implementation factors at a system level and can help aid successful implementation of services delivered in community pharmacies[33]. An understanding of how implementation factors fit with implementation theory can facilitate the selection of interventions that have a higher chance of successfully promoting practice change, identify adaptations so the innovation can be successfully implemented, or help explain outcomes from innovation implementation[34].

Therefore, the objectives of this scoping review are 1) To summarize the extent, range, and nature of research available on enablers and barriers of POC testing implementation for acute infectious respiratory diseases by pharmacists in community pharmacies and identify gaps for future research; and 2) To synthesize identified implementation factors and identify their underpinning theoretical constructs by mapping them to the Consolidated Framework for Implementation Research (CFIR)[35]. The primary objective of the review is of an exploratory nature and corresponds with the methodology of conducting a scoping review[36].

2.2. Methods

This scoping review was conducted according to guidance from the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis[36] and is presented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist[37]. **See Appendix A.**

A review protocol was developed and a poster outlining the proposed methods was presented but neither were formally registered or published[38]. Initially, our objective was to conduct a systematic review of implementation barriers and facilitators for all community pharmacy-based POC testing services and organize factors at the level of the individual according to the Theoretical Domains Framework. However, after identifying a large body of literature and recent innovations in pharmacy practice focusing on strep throat, influenza, and COVID-19 testing, the review was narrowed to acute infectious disease POC testing, using a scoping review methodology, with use of the CFIR to categorize factors at a systems level.

2.2.1. Search Strategy

The search strategy was developed in consultation with a medical research librarian. A limited initial search of OVID Medline was undertaken to identify relevant keywords and index terms. A comprehensive search of 5 electronic databases (OVID Medline, OVID Embase, CINAHL, Cochrane Library, and ProQuest dissertations) was conducted from inception to June 28th, 2022 focusing on two main concepts: “point-of-care testing” and “community pharmacy.” There was no restriction based on study design, publication status, language, or country. **See**

Appendix B. for the final search strategies for each database. The articles retrieved from each database were imported into Covidence[39] for de-duplication and screening. Reference lists of selected papers were checked by one author (OA) to identify additional articles.

2.2.2. Inclusion & Exclusion Criteria

The review included primary peer-reviewed literature that explicitly or implicitly reported one or more implementation factors (i.e., barriers or facilitators) for POC testing services for acute infectious respiratory diseases in the community pharmacy setting from the perspective of pharmacists, pharmacy students, pharmacy technicians, patients, or other healthcare providers (e.g., physicians, nurse practitioners). This included quantitative, qualitative, and mixed methods studies from peer-reviewed journal articles, conference proceedings, and poster presentations focusing on views of adoption prior to implementation as well as implementation studies where POC testing was introduced and applied within the pharmacy setting[40]. Implementation factors were defined as elements that moderate the implementation of POC testing[41]. Barriers were defined as any factors that study participants or authors perceived to moderate or influence the implementation of acute infectious disease POC testing services in a negative way. Facilitators were any factors perceived to moderate or influence implementation in a positive way. The review focused on four POC tests namely strep throat, influenza, c-reactive protein (CRP), and COVID-19. Reviews, letters, commentaries, and protocols of unpublished studies were excluded. Studies that depicted numerous POC tests or data from multiple stakeholder perspectives were excluded when it was not possible to extract data relating to the pertinent tests or from relevant stakeholders.

2.2.3. Evidence Selection

Studies were screened within Covidence[39]. Two authors (OA, MJM) independently screened articles in two phases: title and abstract screening and full-text screening. Calibration occurred prior to title and abstract screening on a random sample of 25 uploaded papers. Discrepancies between reviewers were resolved by discussion during both phases until a consensus was reached and a 3rd party arbitrator was not required. Where the data were published in more than one format, the format that underwent the most extensive peer review process was selected (e.g., a journal article was selected over a conference proceeding.)

2.2.4. Data Extraction

All data were independently extracted by two authors (OA, MJM) into a standardized data extraction form in Covidence (See **Appendix C**). The extraction phase was trialed on five papers and adjusted accordingly. Discrepancies were resolved by discussion and consensus.

Extracted data included: Study details (e.g., authors, publication year, title, journal, country of origin, language, funding), Study methods (e.g., study aim(s), study design, data collection methods, study period), Study population (e.g., sampling strategy, number of participants, response rate, gender); Type of POC test studied; Contextual information (e.g., characteristics of the participating sites, service description, implementation strategies used); and Main results. Direct quotes of barriers and facilitators of implementation were extracted primarily from the results section of each paper but also included the author’s interpretations presented in the discussion if they were related to the study results. For survey measures with an intermediate category (i.e., Likert-scale questions), factors were extracted if >=50% agreed with the intermediate category (i.e., >= 50% agreed or strongly agreed.) If quantitative studies included open-ended questions about implementation barriers or facilitators, they were extracted irrespective of how many respondents agreed they were present[42].

2.2.5. Data Coding

Implementation Phase: The research on POC testing was classified according to the six stages of implementation (i.e., development or discovery, exploration, preparation, testing/initial operation, operation, and sustainability) using definitions derived from previous studies[40, 43]. Studies at the first 3 stages were considered "pre-implementation" studies, while those at the testing/initial operation phase were considered "implementation" studies. For implementation studies, service descriptions were extracted and the strategies used to facilitate service implementation were coded.

Visibility & Application of Theory: The extent to which included studies articulated and applied tools, theories, or frameworks to guide their inquiry into implementation factors was categorized using a five-point typology for theoretical visibility[44]. The categories ranged from "Seemingly absent" to "Consistently applied."

2.2.6. Synthesis of Results (Content Analysis + CFIR)

Content analysis and the 2009 version of the CFIR were used to identify the theoretical constructs underpinning barriers and facilitators extracted from the included studies[34]. The CFIR is a multi-level implementation determinant framework that unifies key constructs from 19 published implementation theories. Implementation factors are organized under five domains: Intervention characteristics, Inner setting, Outer setting, Characteristics of individuals, and the Implementation process[35, 45]. Each domain contains several individual constructs (please refer to http://cfirguide.org/.) The CFIR was chosen because 1) it comprehensively considers factors not only at the level of individual healthcare providers but also those at the organizational and broader societal levels and 2) it has been used to study the implementation of other pharmacy services[30-32], which allows comparison of findings.

Deductive content analysis on the extracted barrier and facilitator data was carried out according to a coding framework established collaboratively by both researchers (OE and MJM)[46, 47]. The coding framework consisted of categories and subcategories primarily based on the work of Wier, Shoemaker, and Moecker[30-32]. Inductive coding was used to create new categories for data that did not fit pre-defined categories. Next, the categories were systematically mapped to an individual CFIR construct and its associated domain. Pilot category coding and CFIR mapping were conducted independently by the 2 reviewers (OE and MJM) on the first 5 studies and subsequently, all coding was done collaboratively through discussion.

Visual analysis and descriptive statistics were used to illustrate the volume (i.e., frequency) of categories, CFIR constructs, and domains across included studies. Identified categories were counted only once per study. Similar to others, descriptive narrative interpretation was used to present the frequently cited CFIR constructs[30]. This approach was implemented to promote seamless integration of both qualitative and quantitative findings.

2.3. Results

As shown in **Figure 2.1**, the search identified 2,232 records. After the removal of duplicates, 1,819 were included in the title and abstract screening. A total of 326 records underwent full-text review. Finally, 43 studies were included for analysis.

2.3.1. Characteristics of Included Studies

The 43 studies were published between 2014 and 2022 and just over half (22/43; 51%) were published between 2020 and 2022 **(Table 2.1.)**. A full listing of the included studies is shown in **Table 2.2.** All studies were published in English. Five were only available as abstracts and 1 was a MSc dissertation. Most commonly, the studies originated from the USA (n=24; 56%) and United Kingdom (n=7; 16%) while few represented research done in France (n=4; 9%), Australia (n=3; 7%), and Canada (n=2; 5%). Point-of-care testing for streptococcal pharyngitis was the most common, studied in 58% of publications (25/43; 58%) while 30% (13/43; 30%) studied influenza, 21% (9/43; 21%) COVID-19, and 12% C-reactive protein (5/43;12%).

Thirty-six studies used quantitative methods[12, 23-25, 28, 43, 48-76] primarily surveys; 6 were qualitative, primarily semi-structured interviews[26, 27, 77-80]; and 1 study used mixed methods[81, 82]. In 12 of the 43 included studies (28%), the primary or secondary aims were to identify barriers and/or facilitators of infectious disease POC testing in community pharmacies. The majority of studies were unfunded.

2.3.2. Implementation Phase & Strategies Used

Twenty-five (58%) of the included studies were implementation projects where POC testing was delivered to participants as part of the study. Pre-implementation studies at the exploration or preparation stage (9/43; 21%) and implementation studies at the initial testing, (23/43; 54%) or full operation phase (8/43; 19%) accounted for the majority of publications. Implementation studies primarily occurred in urban settings (Urban n=17/43; 40%, Rural: n=9/43; 21%).

Implementation studies reported the use of several facilitating strategies **(Table 2.3.)** These included training (n=21/25; 84%), standardized protocols and pathways (n=20/25; 80%), selection of pharmacies more likely to be successful (n=17/25; 68%), and collaborative practice agreements with physicians (n=10/25; 40%). Notably, reimbursement for services was available in (n=9/25; 36%) studies. These were conducted in the United Kingdom[26, 65, 66, 76], Australia[25, 27, 81], United States[69], and France[28].

2.3.3. Visibility of Theory

Only four studies (n=4/43; 9%) used a theory or framework to inform their research. Chalmers consistently applied the framework proposed by Garcia-Cardenas in the post hoc mapping of their pilot study methodology for CRP testing to support pharmacists' management of respiratory tract infections in community pharmacies in Western Australia[81]. Durand consistently applied the CFIR framework in developing the interview guide, conducting thematic analysis, synthesis, and reporting of barriers and facilitators to community pharmacists' perception of antimicrobial stewardship interventions[77]. Smith also partially applied the CFIR framework during the construction of survey questions for evaluating a POC testing training program[43]. Finally, Sahr partially applied the theory of planned behavior (TPB) for question structure and interview guide mapping in their qualitative study of patients receiving rapid strep or influenza testing[79].

2.3.4. Content Analysis & CFIR Findings

The raw data on barriers and facilitators is shown in **Table 2.2.** The 312 individual data items extracted collapsed into 124 categories, and these categories mapped onto 21 of the 38 CFIR constructs covering all 5 domains. The implementation factors were most commonly reported by study authors (i.e., researchers n=20/43 studies; 47%), pharmacists (n=17/43; 40%), or patients (n=13/43; 30%). The reporting frequency of the categories derived as enablers and barriers under each CFIR construct is shown in **Table 2.4**.

The majority of included studies identified factors relating to the Outer setting (n=35/43 studies; 81%), Intervention characteristics (n=24/43 studies; 56%), Inner setting (n=22/43 studies; 51%) and Characteristics of individuals (n=18/43 studies; 42%) domains. Few identified factors related to the Process domain (n=7/43 studies; 16%) **(Figure 2.2.)**.

Across studies, the 5 most commonly identified CFIR constructs were "Patient needs and resources" (n=21/43 studies; 49%); "External policy and incentives" (n=17/43; 40%); "Relative advantage" (n=16/43; 37%); "Available resources" (n=15/43; 35%); "Access to knowledge & information" (n=14/43; 33%); and "Cosmopolitanism" (n=14/43; 33%) **(Table 2.4.**). Several constructs were not mapped, most notably "Evidence strength & quality," "Trialability," and "Other personal attributes." Each concept is now discussed in turn, starting with those identified most frequently and then grouping the remainder according to the CFIR domain**.**

Patient needs and resources (Outer Setting): Patients exhibited favorable attitudes towards POC testing services, including high levels of satisfaction[23, 25, 28, 52, 58-60, 70, 74, 76, 79], reassurance from the tests[26, 52, 75], belief that POC tests give accurate results, and professionalism and helpfulness on the part of pharmacists[23]. Convenience and accessibility of the service were also highly regarded by patients[23, 70, 79]. Furthermore, patients expressed comfort in receiving POC testing from pharmacists[25, 70, 79] and were willing to pay out-of-pocket expenses for the service[25, 56, 60, 72]. Patients deemed POC testing to be within the scope of community pharmacy practice[25], accepted the expanded role of pharmacists[81], and a potential avenue for improved doctor-pharmacist collaboration[25]. Reported barriers included patients' lack of awareness about the service[25, 49, 55, 76], difficulty in recruiting patients[25], patient refusal to undergo testing due to time constraints[25, 28, 78], needle phobia, and lack of perceived need[25]. Additionally, limited influenza activity outside of season[62] and a need for community assessment to determine market demand for POC testing were cited as barriers[43].

External policy and incentives (Outer Setting): The most common barrier, reported by pharmacists and researchers, within this construct was the lack of reimbursement[27, 51, 55, 56, 59, 71, 73]. Two studies identified barriers stemming from legal constraints and/or variations in collaborative practice acts across different jurisdictions in the USA[55, 63]. Inconsistent policies within the healthcare system[69], as well as legislative modifications during the COVID-19 pandemic[66], were each identified by a single study. Proposed facilitators included the availability of reimbursement[28, 50, 51, 68, 69, 73, 81], the endorsement of POC testing by health authorities[28], legislative and policy support from health authorities[64, 81], the granting of prescribing authority to pharmacists[24], and pharmacist certification to provide POC tests[54].

Relative advantage (Intervention Characteristics): Several enablers were identified under this construct. Pharmacists and researchers viewed POC testing as aiding appropriate antibiotic use[25-27, 49, 78, 81], aiding in clinical decision-making[26-28, 74, 77, 81], reducing doctor and hospital visits[25, 26, 74, 78, 80], attracting new clientele[27], improving convenience and accessibility for patients[26, 59, 61, 63, 76, 83], enhancing pharmacist-physician collaboration[27, 81], enhancing engagement and relationship with patients[26], improving patients' care[78], increasing patients' safety[49], and helping prioritize patient referrals to general practitioners[77]. In one study, patients perceived POC testing as a benefit to the community[70], while in three other studies, patients viewed testing as valuable and meeting their needs[23, 25, 76].

Available resources (Inner Setting): Pharmacists reported a number of barriers when performing POC testing, including but not limited to, lack of time[25, 75], inadequate staff[25, 51, 62, 69], increased workload[51, 76], workflow limitations[25, 27, 43, 51, 68], absence of a protocol or pathway to testing[75], and lack of standardized documentation[27, 69]. In three studies, pharmacists expressed concerns about general resource inadequacy[51, 55]. Unique to COVID-19 testing, pharmacists reported insufficient personal protective equipment (PPE)[51, 69]. To address these barriers, various resources were suggested, including increased staffing[26, 51, 68, 69, 73], implementation of a protocol or pathway for testing[12, 28, 43], use of user-friendly and standardized documentation[43, 81], increased PPE[51, 73], incorporation of telemedicine services to acquire prescriptions[43], and a resource for comparing different POC testing products[43].

Access to knowledge and information (Inner Setting): Insufficient training was reported by pharmacists in three studies[54, 55, 73]. Two studies highlighted a lack of knowledge regarding procedures and regulations[51, 54]. Sufficient training in POC testing was identified as an enabler in seven studies[28, 50, 54, 55, 68, 73, 81]. Furthermore, the confidence and comfort level of pharmacists and student pharmacists were reported to improve following training in POC testing[26, 27, 43, 48, 53, 81, 84]. The integration of POC testing into pharmacy curricula was emphasized by pharmacists in one study[54]. Finally, one study reported access to clinical information that was user-friendly and standardized, such as infographics, to be a facilitator[68].

Cosmopolitanism (Outer Setting): Facilitators included having a collaborative relationship with a physician[12, 26, 59, 61, 63, 65], building GP awareness about the test utility[74], encouraging physicians' referrals[26], and support and enthusiasm from physicians about pharmacists providing POC tests[26]. Barriers included lack of collaboration and/or communication with family physicians, as mentioned in four studies[23, 24, 27, 43], and inappropriate GP referrals[76], as cited in one study. Pertaining to COVID-19, challenges in referring patients for further testing and inconsistent communication and data requirements were barriers cited by one study[69]. One study reported that the implementation of pharmacist POC testing had the potential to create difficulties in pharmacist-physician collaboration[78].

Domain: Characteristics of Individuals

Knowledge and beliefs about the intervention: Pharmacists and pharmacy leadership perceived POC testing as a benefit to the community[23, 49, 59, 85] and believed that there is sufficient public demand for it[27, 81]. Pharmacists viewed POC tests as a feasible[81] and valuable clinical service[57]. Barriers were personal and safety concerns when administering COVID-19 testing, as cited in four studies[51, 68, 69, 73], lack of awareness around POC testing, as cited in three studies[49, 55, 57], perceived lack of need[69] and difficulty in deciding between POC testing products[43], each cited by one study.

Individual stage of change: Eight studies cited pharmacists' interest and willingness to provide POC testing for acute infectious respiratory diseases in community pharmacies as an enabler[26, 27, 55, 68, 71, 73, 75, 84], while two alluded a lack of willingness to provide such a service as a barrier[51, 68].

Self-efficacy: Pharmacists' comfort in performing POC testing[51] as well as prescribing therapy based on results[48] was identified as an enabler in two studies. However, one study identified pharmacists' discomfort with discussing the utility and practicality of POC tests with patients as a barrier[54].

Domain: Intervention Characteristics

Complexity: Pharmacists viewed POC testing as a fast, easy, and efficient service[23, 25, 27, 28, 49]. Fast turnaround time of testing was cited in five studies[28, 49, 70, 81, 82], though one study cited the longer turnaround time of polymerase chain reaction (PCR) testing in comparison to rapid antigen testing for Group A Strep as a barrier[12]. The ease of integrating

POC testing into regular workflows was cited in three studies[23, 53, 81]. Furthermore, one study indicated that a low testing volume had a minimal impact on workflow[82], and choosing a user-friendly POC test was cited as an enabler in one study[81]. The difficulty in obtaining treatment for positive patients[43], inconsistent system for POC test service provision[76], difficulty following up with patients, and poor test performance characteristics were cited as barriers[27].

Adaptability: Three enablers were identified under this construct. Delegating technical strep throat POC testing tasks to pharmacy interns or pharmacy technicians was viewed as a way to reduce the average time that pharmacists spent interacting with patients[53]. A modeling study found that in-store testing, as compared to drive-thru testing, was an enabler as it reduced queue and service time[82]. Finally, a survey of American pharmacists identified appointment-based testing for COVID-19 as an enabler of service delivery[73].

Cost: Increased cost to patients[12, 27] and the cost of the test itself[75] were identified as barriers in three studies. Patients in two American studies suggested that POC testing in community pharmacies would be enabled if the cost to perform the test was lower than in other healthcare settings[60, 79].

Domain: Inner Setting

Organizational incentives & rewards: Facilitators reported by pharmacists included motivation to broaden the scope of pharmacy practice, extend professional roles[27, 28, 43, 68], and improve professional satisfaction when offering POC testing services[81]. Other enablers were financial benefits for the pharmacy[43, 59], increased customer footfall[43], and incentives supporting pharmacy staff[69].

Compatibility: Three barriers were identified by pharmacists under this construct. Studies from the USA and France highlighted the apprehension felt by pharmacists toward potential legal ramifications[51, 78]. Pharmacists in Malta and the USA expressed views that POC testing for strep throat and COVID-19, respectively were beyond their scope of practice[51, 73, 75]. In contrast, pharmacists in two studies, identified POC testing for CRP and COVID-19 as being within their scope of practice[27, 51].

Structural characteristics: Lack of space[51, 55, 73], and lack of privacy[51, 78], were identified as barriers. For COVID-19 specifically, lack of a pharmacy drive-thru[51], lack of provision of clinical services[51], and lack of healthcare infrastructure for results sharing were identified as barriers[69]. Enablers suggested were increased space[51, 68], the addition of a pharmacy drive-thru[51], and establishing a supportive technological infrastructure[26, 68].

Domain: Process

Engaging: Three studies identified marketing and promotional strategies to attract customers for the service as an enabler[27, 71, 81], while two identified lacking this as a barrier[25, 76]. One study mentioned public education regarding the role of pharmacists[64], whereas another emphasized the significance of pharmacy organizations advocating for an expanded role of pharmacists as enablers[81]. Finally, pharmacy Faculty Deans identified insufficient education in pharmacy curricula as a barrier and incorporation of more formal training as an enabler[57].

2.4. Discussion

This scoping review identified 43 studies that reported implementation factors that facilitate or impede the adoption of POC testing for strep throat, influenza, CRP, and COVID-19 by community pharmacists around the world.

2.4.1. Summary of Main Results

A large range of facilitators and barriers to service implementation were reported in the included literature however, several implementation factors appeared to be important. These included, 1) Positive patient views and satisfaction 2) Available resources, 3) Collaborative relationships and support from physicians, 4) Presence or absence of reimbursement for POC testing as well as the many 5) Perceived advantages. These factors fell into the CFIR constructs of “Patient needs and resources,” “Available resources,” “Cosmopolitanism,” “External policy and Incentives,” and “Relative advantage” in the domains of Outer setting, Inner setting, and Intervention characteristics.

2.4.2. Comparison with Other Research

This review presents a unique contribution to the existing literature. It builds upon two previous reviews by Gubbins et al. that summarized the use of POC testing for infectious diseases in community pharmacies in the USA and discussed key barriers to service implementation[8, 86]. In comparison, our work is a comprehensive, up-to-date, methodologically rigorous review focused on identifying implementation factors identified in pre-implementation surveys, qualitative studies, descriptive implementation studies, and post-implementation surveys and interviews from the standpoint of various stakeholders. More importantly, our review is the first to use a theoretical framework and systematically map key individual and organizational level factors influencing acute respiratory infectious disease POC testing service implementation in community pharmacies using the CFIR.

Our work also builds on 3 theory-informed reviews that used the CFIR to study implementation factors for novel/professional pharmacy services. In 2019, Weir et al. published a systematic review of 39 studies exploring factors influencing the national implementation of community pharmacy innovations including clinical services, pharmacovigilance, e-technology, and legislative changes[30]. They identified three overarching thematic areas spanning across CFIR domains 1) pharmacy staff engagement, 2) operationalization of innovations, and 3) external engagement. In a critical review of 45 articles, Shoemaker applied the CFIR to create an implementation framework for community pharmacies based on pharmacist professional services including medication therapy management, immunization, and rapid HIV testing[31]. They found that 22 of the CFIR constructs were particularly relevant to pharmacy with many studies revealing constructs within the Intervention characteristics, Outer setting, Inner setting, and Characteristics of individuals domains while relatively few in the process domain. Finally, Moecker et al. conducted a systematic review of 15 studies exploring the effect of intervention complexity on barriers and facilitators to implementation of a wide range of professional pharmacy services including Hepatitis C POC screening. They identified that most implementation factors were reported in the Outer setting and Inner setting domains, whereas only a few were reported in the Intervention characteristics and Process domains. A cross-comparison with these previous reviews is now provided.

In the present review, implementation factors mapped onto 21 CFIR constructs while in the reviews of Weir, Shoemaker, and Moecker they mapped onto 29, 28, and 31 respectively. Important differences appear in that we did not identify factors related to “Evidence strength and quality,” “Peer pressure,” “Relative priority,” and “Other personal attributes,” which were identified in 2 or all three of these other reviews. We speculate that the lack of reference to “Evidence strength & quality” may relate to the relatively small number and observational nature of studies evaluating respiratory infectious disease POC testing especially in community pharmacies. The limited use of theory-informed methods in the individual studies identified and the broader array of pharmacy services included in the other theory-informed reviews may explain why we were not able to identify the latter constructs in our review.

In terms of ***Intervention characteristics***, Weir et al.[30] mentioned both advantages and disadvantages of the innovation, whereas our review identified many advantages including attracting new clientele and enhancing pharmacist-physician collaboration, which were also mentioned by Shoemaker et al.[31]. Similar to our review, which suggested delegating some of the POC testing tasks to pharmacy students or technicians, the use of other staff to support the delivery of medication therapy management was suggested by Shoemaker et al.[31]. POC testing was deemed by pharmacists as fast, easy, and efficient. This aligns with findings from Shoemaker et al. who identified pharmacists providing immunization as not being overly complex[31]. Similar to Weir et al.[30], increased cost to patients and the cost of the test itself were mentioned as barriers by patients in this review, whereas Shoemaker et al. mentioned the cost of having vaccines and necessary supplies can be prohibitive without reimbursement[31]. Time-consuming service provision was mentioned as a barrier by Moecker et al.[32], while our review identified the fast turnaround time of a test as an enabler.

In terms of the ***Outer setting***, positive patient views such as convenience and accessibility, high satisfaction, comfort, and willingness to pay out-of-pocket align with findings from Shoemaker et al. and Weir et al.[30, 31]. Patients were predominantly supportive of POC testing except for some barriers such as difficulty recruiting patients, and perceiving the innovation as lacking in value, which were also identified by Weir et al.[30] and Moecker et al.[32]. Having a collaborative relationship with a physician was also identified by Weir et al.[30] and Moecker et al.[32] whilst Shoemaker et al. mentioned cosmopolitanism for immunizations and HIV testing at a higher level when pharmacies were involved with health departments[31]. Lack of reimbursement was mentioned as a barrier in all reviews[30-32], and the availability of reimbursement or financial incentives for pharmacy staff were also mentioned as enablers in our review and in that of Weir et al. and Shoemaker et al.[30, 31]. While certification was a suggested enabler for POC testing in this review, the need for certification to immunize can be a barrier[31].

In terms of the ***Inner setting***, Shoemaker et al.[31] and Moecker et al.[32] suggested increased private counselling space as an enabler, matching our review. Fear of increased legal liability and mixed views of compatibility and incompatibility with settings or processes were mentioned by Weir et al.[30] and our review. Enablers such as POC testing broadening the pharmacist's scope of practice, improving professional recognition, financially benefiting the pharmacy, incentivizing pharmacy staff, and increasing customer footfall in the pharmacy also echoed Weir et al.[30]. Lack of leadership engagement was mentioned as a barrier in our review and in that of Weir[30] and Moecker et al.[32]. Lack of resources such as staff, time, and workflow limitations were mentioned in all reviews[30-32], and the availability of these resources were suggested in our review and in that of Weir et al.[30] and Shoemaker et al.[31].

In terms of the ***Characteristics of individuals***, Shoemaker et. al.[31] and Moecker et al.[32] mentioned that positive beliefs about the services were important to facilitate the uptake of innovations[31], whereas our review identified mixed positive and negative views about POC testing by pharmacy staff similar to Weir et. al.[30]. Shoemaker et al. mentioned that self-efficacy was observed when pharmacists provided innovations[31]. This supports findings from our review as pharmacists were comfortable administering POC tests and prescribing therapy based on their results. In contrast to Weir et al.[30], in the majority of studies in our review, pharmacists were willing and interested in providing POC testing services.

In terms of ***Process***, purposefully selecting the implementing pharmacies based on interest, facilities & staffing was mentioned as an enabler in our review. Shoemaker et al. mentioned that there were few and limited descriptions of formal planning to implement services[31], and Weir et al. mentioned no piloting and evaluation of innovation before national implementation as a barrier[30]. Moecker et al. mentioned external facilitation helps with the implementation of a service[32]. Weir et al. mentioned a lack of undergraduate exposure to the innovation as a barrier[30]. This aligns with our review, which also identified the insufficient education regarding POC testing in pharmacy curricula as a barrier. Lack of marketing and promotion and better engagement through marketing and promotion were suggested in our review and in that of Weir[30].

2.4.3. Implications for Research, Policy, and Practice

The majority of included studies were quantitative and descriptive in nature. Further theory-informed qualitative research to study implementation should be conducted alongside future experimental research aiming to establish the benefit of POC testing programs for acute infectious respiratory diseases in community pharmacies. Further research should explore implementation factors in rural community pharmacies, a setting where these services could have a larger health system impact. Since having a collaborative relationship with family physicians facilitates service implementation, more research exploring viable strategies to build successful relationships with family physicians should be conducted. Finally, future researchers and stakeholders who want to establish a POC testing program in community pharmacies can use this review to guide service implementation.

2.4.4. Limitations

While this review has several strengths, and to the best of our knowledge is the first scoping review on the topic, there are also several limitations. First, by including surveys conducted at the pre-implementation phase where participants may not have been providing POC testing services, the findings reflect a mix of perceived barriers and facilitators in addition to actual ones experienced. While we also included surveys done at the full operation phase, surveys in general may inflate reporting of certain factors because lists of potential barriers and facilitators are provided to participants. Presumably, the factors that have been identified in the 6 qualitative studies done in the context of implementation projects are more important as they have been directly experienced. Second, only 12 of the 43 studies were specifically designed to study implementation barriers and facilitators. For completeness, studies with researcher-implied implementation factors that were supported by data related to the study findings were included, however, these ultimately may just be researcher interpretations. Third, best practices regarding barrier and facilitator reviews defined by Bach-Mortenson were used[87]. However, the aggregative approach to analysis, focusing on counting the number of studies and occurrences of implementation factors has been criticized. Fourth, after collapsing the raw factors into barrier and enabler categories, these were not further collapsed to form an overarching category (e.g., lack of reimbursement is categorized as a barrier, while the presence of reimbursement is a facilitator, and they are each counted separately). This may result in the overrepresentation of certain factors. Fifth, regarding the CFIR mapping, the results complement previously published reviews, which validates our findings. However, it was at times difficult to map data to categories, as individual factors may fit more than one of the synthesized categories and categories may fit more than one CFIR construct. This was tackled through careful interpretation of the findings and the establishment of decision rules until a consensus was reached between researchers. Last, unlike Weir and Moecker, but similar to Shoemaker, a formal quality assessment for the included studies was not conducted[30-32].

2.5. Conclusion

This review identified a large volume of literature examining the barriers and facilitators to the implementation of POC testing services for acute infectious respiratory diseases in community pharmacies. Knowledge of the wide range of facilitators and barriers identified in this review can help pharmacy managers and researchers design strategies to support successful service implementation. More research is needed to create formal implementation frameworks relevant to clinical pharmacy services to promote successful innovation uptake.

2.6. Declaration of Generative AI and AI Assisted Technologies

The authors did not use artificial intelligence in the preparation of this work.

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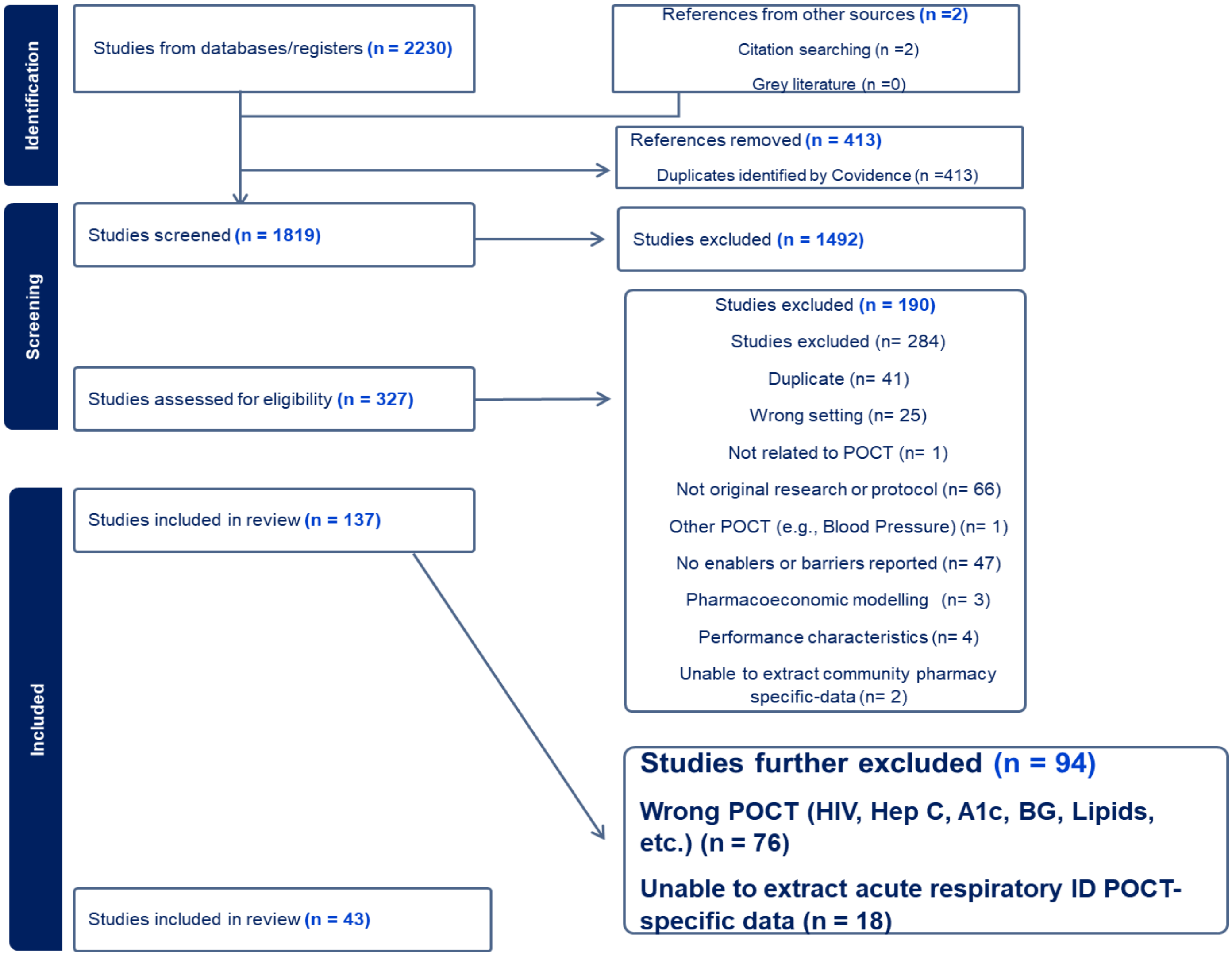
Figure 2.1. PRISMA diagram.



Legend: POCT= point-of-care-testing. Hep C = Hepatitis C. BG = Blood glucose. ID = Infectious disease.

Figure 2.2. Main Implementation Factors, Theoretical Constructs, & Domains Identified during CFIR Mapping

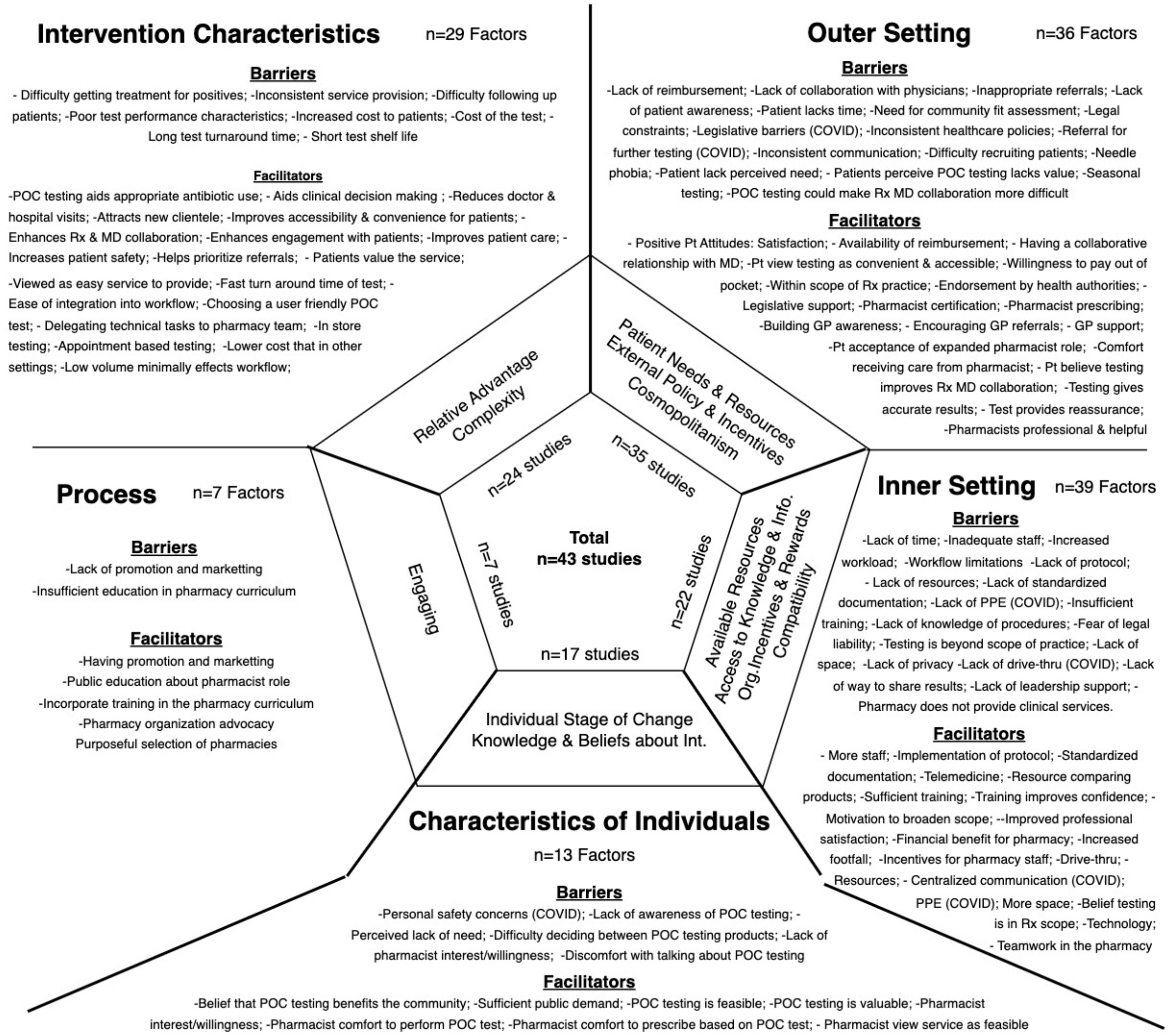


Table 2.1. Characteristics of the Included Studies (n=43)

Characteristic	**Studies n (%)**
Year of Publication	
Before 2015	1 (2.3)
2015-2019	20 (46.5)
2020-2022	22 (51.2)
Publication Type	
Full text	38 (88.4)
Abstract only	5 (11.6)
Country	
USA	24 (55.8)
United Kingdom	7 (16.3)
France	4 (9.3)
Australia	3 (7)
Canada	2 (4.7)
Other*	3 (7)
Research Paradigm	
Quantitative	36 (83.7)
Qualitative	6 (14)
Mixed methods	1 (2.3)
Data Collection Methods **	
Survey	24 (55.8)
Prospective data collection	14 (32.6)
Individual interviews	6 (14)
Analysis of administrative data	4 (9)
Primary or Secondary aim to identify barriers or facilitators	12 (27.9)
Implementation Project	25 (58.1)
Implementation Stage	
Exploration	8 (18.6)
Preparation	1 (2.3)
Testing/Initial implementation	23 (53.5)
Full operation	8 (18.6)
Not applicable	3 (7)
Pharmacy Type	
Chain	16 (37.2)
Independent	16 (37.2)
Mass merchandiser	4 (9.3)
Supermarket	5 (11.6)
Not reported	16 (37)
Urban or Rural	
Urban	17 (39.5)
Rural	9 (20.9)
Point-of-care Test	
Strep throat	25 (58.1)

Influenza	13 (30.2)
CRP	5 (11.6)
COVID-19	9 (20.9)
Framework/Theoretical Foundation:	
Seemingly absent	39 (90.7)
Partially applied	2 (5)
Consistently applied	2 (5)
Implementation Factors	
Explicit	25 (58.1)
Implied	13 (30.2)
Both	5 (11.6)
Group Reporting Factors	
Researchers	20 (46.5)
Pharmacists	17 (39.5)
Patients/Public/Consumers	13 (30)
Pharmacy Students	4 (9)
Pharmacy Technicians	1 (2)
Other	2 (5)
Number of participants reporting factors	
Survey studies – All (n=24 studies)	7,844
Qualitative studies – All (n=6 studies)	187

*Other Country: Japan, Malta, Saudi Arabia (each n=1) ** Other Retrospective Chart Review n=2; Document review n=3; Direct observation n=2

Table 2.2. Summary of included papers

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
Aldrich 2014 USA Ref 48	To assess pharmacists' attitudes toward potential expansion of care areas and their perceived competency and training in each area. --- Not related to IF	Quantitative Descriptive --- Survey	174 Pharmacists --- Pharmacists --- NR	Strep	Exploration --- NA --- Seemingly absent	None	-With appropriate training, pharmacists moderately agree that they are comfortable conducting a rapid strep test (5.81; 7-point Likert scale) -Pharmacists also moderately agreed that based on the results they would feel comfortable prescribing a treatment (5.64).
Azzopardi 2015 Malta Ref 75	To determine Strep A Rapid Test Kit sensitivity and specificity characteristics, to determine patient acceptability of a pharmacist run service and to evaluate pharmacists' perception of such a service. --- Not related to IF	Quantitative Descriptive --- Survey, Prospective data collection	40 patients 50 pharmacists --- Pharmacists Patients --- NR	Strep	Testing/Initial Implementation --- NR --- Seemingly absent	-24/50 (50%) would stock the test. -4/50 (8%) thought the test was too expensive. -11/50 (20%) said the shelf life was too short. -10/50 (20%) said would not have time to perform the test. -7/50 (14%) said the test should not be available in a pharmacy and should be performed in a doctor's office. -Lack of a protocol that allowed pharmacists' prescribing of	-All of the patients said they would undergo the test again if necessary. -40/50 (80%) pharmacists would be willing to perform the test again.

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
						antibiotics if the test gave a positive result.	
Berthelemy 2015 France Ref 50	Describe how sore throat is managed at the community pharmacy level and at identifying the patients' expectations concerning this condition. --- Not related to IF	Quantitative Descriptive --- Survey	1,663 Patients 167 Pharmacists --- Patients Pharmacists --- NR	Strep	Exploration --- NA --- Seemingly absent	None	-2 pharmacists out of 3 consider delivering it in the future depending on adequate training and economic return.
Daunais 2015 USA Ref 54	To evaluate perceived knowledge of pharmacy professionals regarding physical assessment and point-of-care rapid diagnostic testing techniques for infectious diseases. --- Not related to IF	Quantitative Descriptive --- Survey	194 Pharmacists 522 Students --- Pharmacists Students --- NR	Strep, Influenza, HIV	Exploration --- NA --- Seemingly absent	-The majority had not received training on specimen collection techniques for performance of ID RDTs (89.6%), performance of infectious disease RDTs (89.6%), or interpretation of RDTs (82.7%). -The majority of respondents (82.5%) were unsure if the pharmacy practice laws in their state would allow them to conduct RDTs. -Most individuals (66.1%) indicated that they did not feel comfortable	-Overwhelming consensus that pharmacists should undergo more education and training on the use and interpretation of ID RDT. -RDT education/training should be a required part of pharmacy school curricula -pharmacists should be required to undergo training or certification before being allowed to perform RDT.

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
						discussing the clinical utility of ID RDTs with patients primarily due to their lack familiarity of training regarding the tests.	
Huang 2015 USA Ref 57	To more completely determine the extent to which schools/ colleges of pharmacy included content on the theory and application of POC tests for infectious diseases in their curriculum. --- Not related to IF	Quantitative Descriptive --- Survey	114 Pharmacy School Deans --- Pharmacy School Deans --- NR	Strep, Influenza	Exploration --- NA --- Seemingly absent	-Only 18 (15.7%) were aware of pharmacists in their area currently performing such tests in their practice. -Even less respondents (8 [7%]) knew for certain whether pharmacists in their state could be reimbursed for providing POC testing services for infectious diseases. -Only 38 (33.3%) of the responding institutions reported they included content regarding POC tests for infectious diseases in their curriculum. -Our data suggest professional programmes in pharmacy leading to the Doctor of	-Although 88 (77.2%) of survey respondents strongly or somewhat agreed that POC tests for infectious diseases will be a valuable aspect of pharmacy practice in the future. -Sixty-four (84.2%) respondents from institutions that do not provide education regarding POC tests for infectious diseases felt such content should be included in their curriculum

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
						Pharmacy degree provide little if any content regarding such tests in their curriculum. -The two top ranked reasons for not including POCT content were a lack of room in the curriculum and a lack of awareness that pharmacists could use POC tests for infectious diseases in practice.	
Klepser 2015 USA Ref 60	This study describes patient satisfaction with and willingness to pay for a community pharmacy-based GAS pharyngitis point-of-care (POC) management program. --- Not related to IF	Quantitative Descriptive --- Survey	273 Patients, 62 completed surveys --- Patients --- NR	Strep	Testing/Initial Implementation --- -Training -Protocol -CPA -Site Selection -Rx Prescribing -Marketing --- Seemingly absent	None	-52 (84%) of patients were satisfied with the care they received at the pharmacy and would go back to the pharmacy for a similar illness in the future. -58 (93%) of patients indicated that cost of care was important to them in determining where they sought care for GAS. - 57 (92%) would be more likely to come to the pharmacy if the cost were less than the cost of visiting a doctor's office.

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							- (62%) were willing to pay $50 or more for pharmacy provided GAS management.
Klepser 2016 USA Ref 62	To examine the effectiveness of a collaborative physician-community pharmacist program to treat ILI with respect to clinical outcomes and health care utilization. --- Not related to IF	Quantitative Descriptive --- Prospective Data Collection	121 Patients --- Researchers --- Mean: 37 yrs	Influenza	Testing/Initial Implementation --- -Training -Protocol -CPA -Site Selection -Supportive Jurisdiction -Rx Prescribing --- Seemingly absent	For the pharmacies that did not conduct any influenza screenings, the main reasons were: - Limited influenza activity in their community when the service was offered. - Turnover of trained staff during the study period.	None
Klepser 2016 USA Ref 61	To describe a community pharmacy-based, collaborative physician-pharmacist GAS management program through characterization of the patient population and service patterns. --- Not related to IF	Quantitative Descriptive --- Prospective Data Collection	316 Patients --- Researchers --- NR	Strep	Testing/Initial Implementation --- -Training -Protocol -CPA -Site Selection -Rx Prescribing -Marketing --- Seemingly absent	None	-Of patients eligible for participation, 118/273 (43.2%) did not have a primary care provider, and 120/273 (43.9%) were seen at the pharmacy outside regular clinic office hours. -The number of patients who were tested, who did not have a primary care provider or were seen outside of normal office hours, highlights the improved access community pharmacy-based care offers and

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							facilitates providing timely care for patients with acute illnesses. -Physician pharmacists' Collaborative Practice agreement assured adherence to recognized practice standards.
Papastergiou 2016 Canada Ref 24	To investigate the impact and feasibility of community pharmacist-directed influenza screening and to evaluate the proportion of influenza-positive cases that resulted in the initiation of antiviral therapy by pharmacists. --- Not related to IF	Quantitative Descriptive --- Prospective Data Collection	59 Patients --- Researchers --- Median= 45 yrs 64% F	Influenza	Testing/Initial Implementation --- Site Selection --- Seemingly absent	The benefit of a rapid influenza diagnosis was lost because of the necessity for physician intervention to initiate treatment.	-This barrier could be overcome if pharmacists were granted prescribing authority for oseltamivir.
Thornley 2016 United Kingdom Ref 72	A pilot service was introduced to test the feasibility and benefit of a service run from community pharmacies incorporating RADT for patients 12 years and over	Quantitative Descriptive --- Prospective Data Collection.	367 Patients --- Researchers --- 62% F	Strep	Testing/Initial Implementation --- -Training -Protocol -CPA -Site Selection -Rx Prescribing -Marketing -Private Room	None	-Payment did not appear to be a barrier to patients receiving the test and antibiotics as all patients that were eligible based on their Centor score went on to access the paid elements regardless of deprivation index.

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	presenting with sore throat symptoms according to Centor criteria. --- Not related to IF				--- Seemingly absent		
Kawachi 2017 Japan Ref 58	To triage people with symptoms suggestive of influenza and provided appropriate advice on how to prevent the spread of and safeguard against influenza. --- Not related to IF	Quantitative Descriptive --- Survey	52 Patients --- Patients --- Mean: 30.5 yrs 60% F	Influenza	Testing/Initial Implementation --- Protocol --- Seemingly absent	None	-91.7% (22/24) of participants indicated their satisfaction with the community pharmacy-based influenza virus screening.
Corn 2018 USA Ref 53	To quantify the amount of pharmacist time required to complete a point-of-care (POC) test for a patient presenting with pharyngitis symptoms. --- Not related to IF	Quantitative Descriptive --- Survey Direct Observation	Pharmacists Students 1 Standardized Patient --- Researchers --- NR	Strep	NA --- NA --- Seemingly absent	None	-Pharmacy staff were nervous and somewhat uncomfortable with providing this novel service, but they also recognized how much easier and more confident they felt after providing the service one time. -Can be implemented into regular workflows with little to no disruption of other activities -If a pharmacist intern screened the patient and collected the vital

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							signs (sequence 2), the average time the pharmacist spent per encounter was reduced from 12.7 + 3.0 minutes to 2.6 + 1.1 minutes. (80% reduction)
Demore 2018 France Ref 28	To test the feasibility, benefit and acceptance of a community pharmacy-based ABS intervention based on RAT use in adult patients with sore throat. --- Not related to IF	Quantitative Descriptive --- Survey Prospective Data Collection.	559 Patients 74 Pharmacists --- Patients Pharmacists --- Median: 27.8 yrs 64.3% F	Strep	Testing/Initial Implementation --- -Training -Protocol -Reimbursement -Private Room --- Seemingly absent	Patients (Most common causes for refusal) -Lack of time to perform the test -Low perceived benefit	-All (138/138) evaluable patients undergoing the test declared to be satisfied with the use of RAT -Would accept the test again in the future Pharmacists' Feedback: -Sufficient time spent during the training -Easy to use the RAT (did not encounter any difficulty realizing the pharyngeal swab) -The result was sufficient to guide clinical management -Sufficient protocol to guide patient management -Duration to do the testing was convenient -Opportunity for professional development -Would welcome the routine introduction of RAT in their daily

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							practice, if endorsed and financed by the Health Authorities.
Dulaney 2018 USA Ref 55	To assess community pharmacists' perceptions of influenza and streptococcus pharyngitis POCT and corresponding treatment for either infection in the Delta region of the United States. --- Not related to IF	Quantitative Descriptive --- Survey	146 Pharmacists --- Pharmacists --- NR	Strep, Influenza	Exploration --- NA --- Seemingly absent	-Resources to perform the task -Pharmacist cognitive barriers - Financial viability -Facility issues -Legal barriers -External stakeholder perceptions (Lack of patient and provider awareness of the service).	-Pharmacists are willing to perform POCT in a community pharmacy setting. -pharmacists agreed that staff could be adequately trained to assist with the support of influenza and streptococcal pharyngitis POCT.
Klepser 2018 USA Ref 63	To assess if a previously validated model could be utilized to improve patient care and population health outside the structure of a prospective research study. --- Not related to IF	Quantitative, Descriptive --- Survey, Analysis of Admin Data	661 Patients --- Researchers --- Mean: 29 yrs 62% F	Strep, Influenza	Testing/Initial Implementation --- -Training -Protocol -CPA -Rx Prescribing -Marketing --- Seemingly absent	-Differences in collaborative practice acts between states. -Organizational resources (each collaborative care team had to develop a process for providing the service that fits their practice setting.)	-Improved/increased accessibility for patients without a PCP and outside of normal clinic hours.- Patients presented to the visit outside normal clinic hours for 38% of the visits. - 53.7% indicated they did not have a primary care provider. -Collaborative care team/model.
Papastergiou 2018 Canada Ref 23	To assess the implementation feasibility and effects of a community	Quantitative Descriptive --- -Survey	7,050 Patients --- Patients Researchers ---	Strep	Testing/Initial Implementation --- -Training -Protocol	-Communication of recommendations to the physician remains a barrier.	-Speed and efficiency were identified by patients as the most common reasons for wanting to use such a

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	pharmacist-directed point-of-care testing program for GAS. --- Not related to IF	-Prospective Data Collection - Analysis of Admin Data	Mean: 27.3 yrs 63.1% F		-Site Selection -Rx Prescribing -Marketing --- Seemingly absent		service again in the future. Reasons for wanting to use the service again. -Fast/quick/efficient service (54%) -Quick result (26%) -Easy (18%) -Convenient (16%) -Helpful/friendly/ professional customer service (15%) -Access to treatment /appropriate medication sooner (13%) -Accurate/reliable results (7%) -No appointment necessary (6%) -Good/valuable program/meeting my needs (4%) - 81% of patients were very or somewhat satisfied with receiving a GAS test at the pharmacy. - 91% identified the pharmacy as a convenient location. - 93% would be very likely or somewhat likely to use the service again. -High participation indicates that pharmacy

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							owners and managers perceived value of the program. -Ease of implementation into the existing workflow.
Wakeman 2018 United Kingdom Ref 74	investigate the feasibility of a rural community pharmacy delivering POC CRP testing to help evaluate the most appropriate intervention in RTIs and integrate this service with local GP surgeries. following the initial consultation. --- Not related to IF	Quantitative Descriptive --- -Survey -Prospective Data Collection	52 Patients --- Patients Researchers --- NR	CRP	Testing/Initial Implementation --- -Training -Protocol -CPA -Site Selection -Marketing -Private Room --- Seemingly absent	None	-All patients reported a satisfactory experience with the quality of the consultation process and intervention - In total, 95% of patients who received the POC CRP test reported that they would have otherwise visited the GP and would have expected to be prescribed antibiotics - GP awareness of the usefulness of the test and being able to properly interpret the result are crucial conditions for a positive effect of the CRP intervention. -Very high test results helped provide staff with confidence in their recommendation for patients to visit a GP and seek consideration of antibiotic treatment. A low CRP test result

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							was found to be reassuring for the patient.
Cooke 2019 United Kingdom Ref 52	To ascertain whether CRP POCT in a community pharmacy could assist in reducing prescribing of antibiotics for patients presenting with symptoms of RTI. --- Not related to IF	Quantitative Descriptive --- Survey Prospective Data Collection	40 Patients --- Patients --- NR	CRP	Testing/Initial Implementation --- NR --- Seemingly absent	None	-Almost all patients found the test useful and would recommend it as it provided reassurance that the symptoms were not serious.
Klepser 2019 USA Ref 12	To demonstrate the feasibility of implementing a CLIA-waived molecular test into a community pharmacy setting as part of a collaborative influenza and GAS disease management program. --- Not related to IF	Quantitative Descriptive --- Retrospective Chart Review	202 Patients --- Researchers --- Mean: 30.1 yrs 58% F	Strep, Influenza	Testing/Initial Implementation --- -Training -Protocol -CPA -Rx Prescribing -Marketing --- Seemingly absent	-Additional time to run the PCR-based test. -The higher cost of the PCR-based test.	-Collaborative practice agreement. -Using clear protocols."
Mantzourani 2019 United Kingdom Ref 26	To explore the views and opinions of CPs regarding their initial experience of and levels of	Qualitative Descriptive --- Semi-structured interview	7 Pharmacists --- Pharmacists --- 29% F	Strep	Testing/Initial Implementation --- -Training -Protocol -Site Selection	None	"Theme I: 1. Impact on Patient Care -The structure of the service was crucial to ensuring the service's success

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	preparedness for the new STTT service in Wales. --- Primary aim related to IF				-Rx Prescribing -Reimbursement --- Seemingly absent		- The technology infrastructure was crucial to ensuring the service's success. - Pharmacists perceived the service as contributing to AMS. - Pharmacists believed the service would rebalance primary care resources. 1. Service Set-Up as A Tool for Patient Education: -Pharmacists believed POCT was vital to decision-making and reduced unnecessary antibiotic use which adversely impact on the fight against AMR. -POCT result supported patient education; results made patients more accepting of the consultation outcome. 2. Role of Service in Antimicrobial Stewardship: - Opportunity for pharmacists to implement AMS and contribute to the fight against antimicrobial resistance. (Reduce unnecessary antibiotic

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							use + educate patients about proper antibiotic use, thus changing behaviour.) 3. Appropriate Use of Primary Care Resources. -Potential to reduce the number of GP appointments for uncomplicated sore throats -Education on pharmacists' role increases patient confidence in consulting with pharmacists for other conditions. 4. Improved Access to Services: -Pharmacists believed the main benefit of the service to patients was increasing public choice and accessibility. Theme II: Empowering Pharmacists To Deliver The Service 1. Role of Training in Developing Confidence with Delivery and Differential Diagnosis

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							- Training (Confidence with Delivery and Differential Diagnosis) 2. Appropriate Staffing Resource: Pharmacists' concern about how long consultations would take, time constraints, impact on workflow, increased workload. 3. Willingness To Engage: -All participants were very enthusiastic about providing STTT and believed this willingness is key for any scheme's success. Not all pharmacists are willing to engage in expanded services. Theme 3: Interface with GP Surgeries 1. Pre-Implementation and Nature of Existing Relationships -Having good pre-existing relationships with GPs; successful communication of the service, supports service success. 2. Perceived value of service

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							-GPs were enthusiastic about the service as it could reduce their workload in relation to acute sore throats. 3. Role of GP staff in ensuring service success by making referrals, taking calls, & signposting patients to local pharmacies”
McKiernan 2019 USA Ref 67	Describe the development and implementation of POCT training for student pharmacists at the Washington State University (WSU) College of Pharmacy and Pharmaceutical Sciences. --- Primary aim related to IF	Quantitative, Analytic observational cohort --- -Survey -Direct Observation	161 Students --- Students --- NR	Strep Influenza HIV	Preparation --- NA --- Seemingly absent	None	-Providing training improved student pharmacists’ comfort and confidence in testing and initiating therapy for influenza and group A strep. -Students would recommend implementing testing for influenza and GAS in a community pharmacy. -Pharmacy students would implement influenza, strep, and HIV testing/screening services if they owned a community pharmacy. -Students believe offering point-of-care training services in their community is important.

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
Hardin 2020 USA Ref 56	To describe the development and implementation of an influenza POC testing service in a large community pharmacy chain, identify successes and barriers to the implementation, and identify areas of improvement to enhance POC testing services in a community pharmacy setting. --- Primary aim related to IF	Quantitative Descriptive --- Retrospective Chart Review	42 Patients --- Researchers --- 53% Female	Influenza	Testing/Initial Implementation --- -Training -Protocol -CPA -Site Selection -Rx Prescribing --- Seemingly absent	-Health insurance cannot be billed due to current pharmacy reimbursement practices.	-Patients were willing to pay for the service out of pocket, indicating the usefulness of pharmacy-based POCT testing.
Kirby 2020 USA Ref 59	To implement an influenza and streptococcus POCT service as part of a community pharmacy residency longitudinal project to expand both access to pharmacist-provided services and the clinical offerings of the pharmacy. --- Not related to IF	Quantitative Analytic, Observational Cohort --- Survey, Prospective Data Collection	73 Patients --- Patients Researchers --- NR	Strep, Influenza	Testing/Initial Implementation --- -Training -Protocol -CPA -Rx Prescribing -Marketing --- Seemingly absent	-Barriers exist for pharmacies in billing for POCTs, this potentially prevented some patients from using the service.	-Patients had high satisfaction with the service. (Satisfaction ranged from 4.88 to 5.00 out of 5 in all groups and 98% of participants reported being satisfied, or very satisfied) -Patients had a high likelihood of recommending the service to others. (Participants answered in a range of 4.88 to 4.93 out of 5 among all groups.)

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							-The majority of patients presenting for the service were insured, and established with a PCP highlighting the convenience niche that community pharmacists can fill. -Having a collaborative practice agreement that allows prescribing and ordering lab tests. -The study demonstrated a pharmacy clinical-non dispensing revenue, direct payment service - The service was determined by pharmacy leadership to be a benefit to both the community and the pharmacy and therefore will continue to be offered.
Mantzourani 2020 United Kingdom Ref 65	To evaluate whether a pharmacy-led STTT service had an impact on antibiotic use, patient safety, and GP consultation rates.	Quantitative, Analytic, Observational cohort --- -Prospective Data collection -Analysis of Admin Data	1725 Patients --- Researchers --- Median= 29.2 66.3% F	Strep	Testing/Initial Implementation --- -Training -Protocol -Site Selection -Rx Prescribing -Reimbursement ---	None	-Results suggest a high degree of GP collaboration. 57.4% of all consultations took place following referral by the patient's GP.

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		--- Not related to IF			Seemingly absent		
Smith 2020 USA Ref 43	To evaluate the National Association of Chain Drugstores' point-of-care testing (POCT) training program's effect on the implementation of pharmacy POCT services in Arkansas and barriers that may have prevented or slowed implementation. --- Primary & Secondary aims related to IF	Quantitative Descriptive --- Survey	25 Pharmacists --- Pharmacist Researchers --- NR	Strep Influenza	Full Operation --- NA --- Partially implied CFIR	-Adjusting workflow to accommodate POCT services. -Determining from which manufacturer to purchase POCT supplies. -Reassigning job duties to accommodate POCT. -Determining the market for POCT in your community. -Of the respondents currently offering POCT services (n =11), 10 (90.1%) do not have a disease state-management protocol with a physician that allows them to initiate treatment for a positive POCT result. -All respondents who attempted or currently have a disease state-management protocol cited physicians' resistance as a barrier to obtaining the protocol.	-At the conclusion of the NACDS live training, pharmacists felt very prepared to begin offering POCT services. -Additional Resources: - Example pharmacy protocols. (91.7%). - Example patient intake forms. (58.3%). - Resource for comparing available products from different manufacturers. (58.3%). -Motivation for offering POCT services: - Increase clinical services beyond dispensing product (60.1%). - Potential to expand their revenue (17.4%). - To expand their customer base by offering a unique service (8.7%). -Using other technology such as

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						-The greatest barrier to implementation for 9 (42.8%) was deciding how to obtain treatment for patients with a positive test result. Other Barriers to Implementation -Adjusting workflow to accommodate POCT (33.3%).	telemedicine services to obtain prescriptions.
Badr 2021 Saudi Arabia Ref 49	To assess public's and community pharmacist's perception of RADT use as a diagnostic tool for bacterial pharyngitis in children prior to Abx dispensing in CPs in Saudi Arabia. --- Not related to IF	Quantitative Descriptive --- Survey	689 Patients 40 Pharmacists --- Patients Pharmacists --- Patients: 90.9% F Pharmacists: 0% F	Strep	Exploration --- NA --- Seemingly absent	-Few of the public knew about RADT (only 4% have heard of RADT to differentiate between viral and bacterial pharyngitis). -95% of pharmacists did not hear about RADT. -After a brief description of the test, 87.5% believed the test would be a benefit to society.	Pharmacist reasons for supporting RADT use: -To decrease antibiotic misuse and abuse. -To decrease bacterial resistance Increased specificity -To obtain an accelerated result easily. -Pharmacists believed the test would benefit the society. -Patients were supportive of using RADT to differentiate between bacterial and viral pharyngitis. -Coded reasons for patient support -decreased antibiotic side effect and complication

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							- increased specificity - increased overall safety - easy and fast diagnostic tool
Chiu 2021 USA Ref 82	To compare different POC testing implementation methods using molecular testing for COVID-19 in a pharmacy setting. --- Not related to IF	Quantitative, Analytic, Observational, --- -Simulation Modeling -Prospective Data collection	NA --- Researchers --- NA	COVID-19	NA --- NA --- Seemingly absent	None	-Total Hands-on Time: Choose POCT with lower hands-on time to minimize labor costs. (One minute or less) - Drive-thru testing via scheduled appointments: It is not possible to implement drive-thru testing with scheduled appointments without increasing the queue and service time. - By running only 12 samples per day, instead of 24, the impact on service times was reduced and similar to the baseline workflow.
Essilini 2021 France Ref 78	To explore French CPs' views on antibiotic use/resistance and ABS; their role and current practices in ABS; and the future potential opportunities for ABS given the	Qualitative Descriptive --- Semi-structured interview	27 Pharmacists --- Pharmacists --- 52% F	Strep UTI	Exploration --- NA --- Seemingly absent	-Fear that authorization for pharmacists to perform POCT would make GP-pharmacist collaboration even more difficult. -The question of the responsibility in	-POCT improves patients' care and avoids unnecessary prescription of antibiotics. (19/27) - Wish to do sore throat tests to avoid medical consultation for viral infections and refer

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	evolution of their profession. --- Not related to IF					withholding antibiotics in case of false negatives. - It takes time, and the patients are waiting and wouldn't necessarily understand -There is no privacy to conduct the test at the counter	positive patients. (19/19)
Klepser 2021 USA Ref 64	Update the previous national benching report and examine both the number of pharmacies in the United States with CLIA Certificates of Waiver before and after the COVID-19 pandemic and the state-by-state differences in the percentage of pharmacies with CLIA Certificates of Waiver. --- Not related to IF	Quantitative Descriptive --- Document Review	NA --- Researchers --- NA	COVID-19	Full Operation --- NA --- Seemingly absent	None	-State and federal action to clarify the legal authority of pharmacists to provide CLIA-waived tests. - Concentrated public health efforts to utilize Pharmacies as convenient, accessible points of care.
Mantzourani 2021 United Kingdom	To explore patient views of the STTT service using a methodology co-	Quantitative Descriptive --- Survey	510 Patients --- Patients ---	Strep	Testing/Initial Implementation --- -Training	Patient Barriers to further roll-out: - Low awareness of the service.	-98.2% of patients were satisfied with the service.

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Ref 76	designed with patients as part of the research team. --- Not related to IF		70.7% F		-Protocol -Site Selection -Rx Prescribing -Reimbursement --- Seemingly absent	- Inconsistent commissioning of the service and availability. - Inappropriate referrals by GP teams. - Consideration for the increased workload for pharmacists. - Lack of publicity of the service limits patient engagement. Pharmacy services need to be better promoted to the general public.	-98.4% of patients would recommend the service to others. -98.8% of patients would return to the pharmacy for the service again. -Service perceived by patients as accessible and convenient. -Patients felt very strongly about the professionalism of the pharmacy team, which made them feel comfortable. -Patients perceived the service as valuable, increased their confidence, in the treatment outcome, reduced diagnostic uncertainty and reassured them about their condition.
Nguyen 2021 USA Ref 68	To determine Idaho pharmacists' willingness to provide COVID-19 services and assess their perceptions of needed resources to provide such services. ---	Quantitative Descriptive --- Survey	229 Pharmacists --- Pharmacists --- NR	COVID-19	Full Operation --- NA --- Seemingly absent	- Safety precautions and PPE - COVID testing would add to workload & logistics of performing testing would need streamlining. - Lack of interest in expanded scope opportunities related	-Pharmacists indicated a willingness to provide COVID-19 services, if available. More than 70% said they would definitely or probably be willing to provide COVID-19 antigen (n = 162) and antibody (n = 179) testing, respectively.

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	Primary aim related to IF					to COVID-19 services.	- Education/training. - Supplies for service provision. - A reimbursement mechanism. - Staffing and workflow modifications. - Infographic topics on COVID-19 testing. -Pharmacist interest in expanded scope opportunities related to COVID-19 services. -Technology to bill for services -Storage for supplies for service provision. -Personnel. -Technology to document services.
Paul 2021 USA Ref 71	To better estimate the capacity to use pharmacists as first responders to COVID-19. --- Secondary aim related to IF	Quantitative Descriptive --- Survey	30 Pharmacists --- Pharmacists --- NR	COVID-19	Full Operation --- NA --- Seemingly absent	-The primary barrier to pharmacists augmenting the current COVID-19 pandemic response is the lack of reimbursement for services provided.	-63% of pharmacists reported interest in providing COVID-19 nasal testing if a mechanism for reimbursement for test administration and supplies was established to support sustainability. -Pharmacists requested the development and dissemination of additional COVID-19 information to assist

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							with educating the community about COVID-19.
Sim 2021 Australia Ref 25	To evaluate the feasibility, based on clinical and operational outcomes, of POC CRP testing to support pharmacists' management of RTIs in community pharmacies in Western Australia (WA). --- Not related to IF	Quantitative, Analytic Observational Cohort --- -Survey - Prospective Data Collection	131 Patients --- Patients Researchers --- Mean: 39.6 52.4% F	CRP	Testing/Initial Implementation --- -Training -Protocol -Site Selection -Private Room -Reimbursement -Interns/Assistants --- Seemingly absent	Reasons for non-provision of the service: -Patient refusal (Lack of time on the patient's part, lack of understanding of the service, needle phobia, not wanting to receive the service) -Pharmacy unable to offer service due to time constraints and competing demands, or the unavailability of a study pharmacist. -The program was implemented without any accompanying community marketing campaign.	-Changed patient perceptions about their need for antibiotics. -Improve public awareness and reduce inappropriate antibiotic use and unnecessary visits to doctors or hospital emergency departments. -Public demand for a test to help gauge the need for antibiotics for cough and colds in community pharmacies. -May enhance collaborations between pharmacists and doctors. - CRP value testing in reinforcing pharmacists' recommendations. -Overall, I am satisfied with the service. - Willingness to use the service again. -Easy and quick. -Very comfortable with the pharmacists performing the test.

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							-Testing should be offered in a community pharmacy. -Ninety-nine participants (84.6%) indicated a willingness to pay for CRP testing at Day 5 follow-up, which was higher than the willingness to pay immediately post-service (81/131; 61.8%) -This willingness to pay highlights the perceived added value of CRP testing from the consumers' perspective
Uebbing 2021 USA Ref 73	To collect views of pharmacists about the potential of pharmacist-administered COVID-19 tests. --- Not related to IF	Quantitative Descriptive --- Survey	122 Pharmacists --- Pharmacists --- NR	COVID-19	Full Operation --- NA --- Seemingly absent	Personal and Safety Concerns: -Bringing home, the infection to my family. -Not having enough PPE. -Getting infected. -Not being properly trained. -Competing responsibilities. -Not getting paid for the service. -It's outside my scope of practice.	-Get reimbursed. -Adequate PPE available. -Instructor-led living training or self-guided available. -Adequate support staff. -Willing to participate in COVID-19 testing. -Appointment testing is preferred to on-demand testing

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						-Practice site could not be made safe through modifications for testing.	
Brust-Sisti 2022 USA Ref 51	To identify NJ pharmacists' perceptions regarding COVID-19 testing and the potential impact of testing within pharmacies. --- Primary aim related to IF	Quantitative, Analytic Observational ---- Survey	523 Pharmacists --- Researchers Pharmacists --- Testing: 50% F Not Testing 56.3% F	COVID-19	Full Operation --- NR --- Seemingly absent	-Logistical Barriers: -56.1% feel that you do not have adequate resources to perform COVID testing. -75.3% of respondents not providing COVID testing attributed this to a corporate or business decision by their pharmacy employer not to test patients -Lack of a pharmacy drive-thru (17.7%) -Insufficient staff (17.2%) -Insufficient PPE -Potential workflow disruption (17.2%) -Pharmacists consistently described lack of reimbursement as a barrier (3). Personal Concerns: -Spreading virus to others, exposure to people, contracting	-Increased staffing. -Increased reimbursement. -Increased PPE. -Addition of drive-thru. -Increased space. -Comfortable and would be comfortable providing testing.

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						the virus, impact on mental health -Don't believe pharmacists should play a larger role in healthcare by providing COVID-19 testing -Increased workload -Unfamiliar with procedures or regulations, -Liability -Employee safety concerns (6) -No direct patient interaction (4) -Disagree with testing (3). -Reimbursement concerns (3) -High volume (1). -Insufficient space (1). -Lack of supplies (1). -Liability concerns (1). -Store does not meet requirements (1).	
Chalmers 2022 Australia Ref 81	Mapping the methodology for the pilot study of point-of-care C-reactive protein (CRP) testing to support	Mixed Methods, Analytic Observational Cohort, --- -Survey	10 Pharmacists 5 Assistants /interns --- Pharmacists Assistant/interns Researchers	CRP	Testing/Initial Implementation --- -Training -Protocol -Site Selection -Private Room	None	Existing Facilitators - National and international pharmacy organization support for advanced community pharmacy services

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	pharmacists' management of respiratory tract infections in Western Australian pharmacies against an implementation factor framework, focusing on the resources and training program provided to participating pharmacy staff. --- Primary aim related to IF	-Document Review	--- 33.5 yrs. 80% F for pharmacists 24 yrs. 100% F for assistants /interns		-Reimbursement - Interns/Assistan ts --- Consistently applied. Garcia-Cardenas		- Legislative and policy support for community pharmacy services involving skin penetration. - Consumer acceptance of community pharmacy POC and vaccination services Strategies to Facilitate Implementation - Purposive recruitment of community pharmacies based on geographical location, accreditation, facilities, and staffing - Purposive recruitment of community pharmacies via an expression of interest process (early adopters) - Comprehensive on-site training and supporting documentation - Integration of the service into existing workflows for RTI presentations, supported by user-friendly documentation - Patient flyer to raise awareness of the service

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							- Remuneration to cover the costs of service provision - Use of a reliable, user-friendly POC CRP testing device that produced a result in a timely manner Pharmacy Staff (Questionnaire) - Training improved knowledge, confidence, and competence to perform CRP testing. - Pharmacists believe it is feasible to provide CRP testing. - CRP testing will enhance collaboration with GPs. - Integrating efficiently with work practices. - Improving professional satisfaction as a pharmacist. - Appropriate remuneration for service provision. (Researchers) - Pharmacists believe that public demand for testing to inform AB use, improve awareness

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							of antibiotics, and for RTI triage. - Assist in clinical decision-making about the need for referral to a GP for antibiotics.
Czarniak 2022 Australia Ref 83	To explore pharmacists' experiences and perspectives, including barriers and facilitators to service provision and uptake by consumers, regarding the implementation and sustainability of POC CRP testing in RTI management in purposively selected community pharmacies in Western Australia (WA). --- Primary aim related to IF	Descriptive Qualitative, Semi-Structured Interviews	10 Pharmacists --- Pharmacists --- Mean: 36 yrs 80% F	CRP	Testing/Initial Implementation --- -Training -Protocol -Site Selection -Private Room -Reimbursement -Interns/Assistants --- Seemingly absent	-Challenging interactions with general practitioners. -Competing demands. -Difficulty in follow-ups. -Early stage of disease may not be reflected in CRP testing. -Heavy documentation. -Inadequate remuneration to justify multiple pharmacists at one time. -Perspectives of patients – bulk billing from general practitioners."	-Accessibility and credibility of pharmacists. -Enhanced relationships with general practitioners. -Improved professional image and strengthened existing or established new pharmacist-patient relationships. -Marketing and promotion to encourage service uptake. -Practice and experience promote confidence. -Supportive team.
Durand 2022 France Ref 77	To explore the perceptions, currents practices and interventions of community pharmacists regarding	Qualitative Descriptive --- Semi-structured interview	16 Pharmacists --- Pharmacists --- 50% F	Strep	Exploration --- NA --- Consistently applied. CFIR	None	-Some pharmacists (n=4/16, 25%) highlighted the need for increased point-of-care testing in community pharmacies, namely urine dipstick and rapid

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	antimicrobial stewardship. --- Secondary aim related to IF						strep testing, to optimize patient triage and prioritize patient referral to GPs for infections requiring antibiotic therapy.
Mantzourani 2022 United Kingdom Ref 66	To explore the impact of removing the requirement for a GAS POCT from a community pharmacy STTT service on antibiotic supply. --- Not related to IF	Analytic, observational cohort --- Analysis of admin data	Pre=4468 patient consultations Post=199 patient consultations --- Researchers --- NR	Strep	Testing/Initial Implementation --- Training -Protocol -Site Selection -Rx Prescribing -Reimbursement --- Seemingly absent	-Changes to the delivery model necessitated by the COVID-19 pandemic reduced the number of steps prior to community pharmacists offering antibiotics, and consequently the number of opportunities to rule out GAS infection and target antibiotics more appropriately. Pharmacists were significantly more likely to offer antibiotics. When they relied on clinical scoring without POCT.	None
O'Connor 2022 USA Ref 69	To quickly design, implement, and disseminate a pharmacy-based point-of-care testing program during a public health crisis.	Quantitative Descriptive --- Prospective Data Collection	2425 Patients --- Researchers --- NR	COVID-19	Testing/Initial Implementation --- -Training -Protocol -Site Selection -Supportive Jurisdiction	Main reasons for opting out: -Staff capacity - Staff safety - Perceived need for service in their community	Key Points (Findings) - Shared resources are helpful. - Incentives supporting workflow implementation are helpful.

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	--- Not related to IF				-Marketing -Reimbursement -Check ins --- Seemingly absent	Program Challenges/Problems - Inconsistent policies and communication preferences among 7 public health district & State public health experts - Inconsistent state-level and district data needs - Initially, no mechanism to report COVID-19 POCT results - Variable PPE access among public health districts - Unmet initial PPE needs - Ongoing PPE needs - Need to offer PCR sample collection for negative or asymptomatic patients.	-Centralized communication and support are important to success of widespread implementation. - Establishment of public and private payer provider-level funding streams was determined critical to financial sustainability - Dedicated billing support staff.
Patel 2022 USA Ref 70	To determine the local impact of community pharmacist-provided COVID-19 testing among a majority-Hispanic, lower income population during the early COVID-	Quantitative, Analytic Observational Cohort --- Survey	622 Patients --- Patients --- Mean: 42 yrs 51% F	COVID-19	Full Operation --- -Training -Marketing --- Seemingly absent	None	-Comfortable going to a community pharmacy to receive testing for COVID-19 infection (64.2% strongly agree). Over 99% of survey patients felt comfortable receiving COVID-19 testing at a

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	19 pandemic, as assessed by a patient satisfaction survey. --- Not related to IF						community pharmacy setting. -Overall, I am satisfied with the testing services received (67.5% strongly agree 31.7% agree). -I would be willing to receive a pharmacist-provided test for COVID-19 infection at a community pharmacy again (65.3% strongly agree). -Most of the patients did not know where they would have gone to obtain a COVID 19 test if the El-mirage Walgreens site was not available. -More than 97% reported having the community pharmacy testing site available expanded their access to healthcare services. -Patients appreciate having a non-appointment testing option. -98% agreed that they received their rest results quickly. Nearly 100 patients praised the

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
							fast turnaround time of the testing site. -Patients praised the staff's professionalism and friendliness. -The service benefits the community.
Sahr 2022 USA Ref 79	To determine patients' experiences with rapid strep and influenza tests administered at community pharmacies, focusing on what impacted patients' decisions to receive care, evaluate their perception of the care received, and determine if offering these tests in community pharmacies expanded their access to care. --- Primary aim related to IF	Qualitative Descriptive --- Semi-structured interview	11 Patients --- Patients --- Median: 40 yrs 82% F	Strep Influenza	Full Operation --- -Training -CPA -Site Selection -Rx Prescribing --- Partially Applied Theory of Planned Behavior (TPB)	None	-Convenience to Patients; Can save time, is less burdensome, and pharmacy location is more convenient and physically accessible. -Quality of care; received appropriate care that met or exceeded expectations, pharmacists communicated well. -Patients comfortable with pharmacy staff. -Participants preferred POCT in a community pharmacy. -Improved Access to Care, more timely than other HCPs. -Testing is affordable.
Zhang 2022 USA Ref 80	To explore pharmacy students perceptions about pharmacists' impact during the	Qualitative Descriptive --- Analysis of essays	116 Students --- Students --- NR	COVID-19	NA --- NA --- Seemingly absent	None	Regulations currently allow point-of-care testing in many community pharmacies, which students recognized to

Author, Year, Country	Study Aim	Study Design Data Collection	Participants, Group Reporting, Age, Gender	POC Test	Stage, Strategies, Theory Visibility	Barriers	Facilitators
	COVID-19 pandemic --- Not related to IF						offload some of the burden placed on testing facilities and hospitals.

Legend: NA: Not Applicable; NR: Not Reported; ID: Infectious Disease; IF: Implementation Factor; RDT: Rapid Detection Test; CPA: Collaborative Practice agreement; PCP: Primary care provider; GP: General Practitioner PPE: Personal Protective Equipment; PCR: Polymerase Chain Reaction; CRP: C-reactive Protein; CFIR: Consolidated Framework for Implementation Research. POCT: Point-of-care test; UTI: Urinary Tract Infection; AMS: Antimicrobial Stewardship

Table 2.3. Reported Strategies Used to Facilitate Service Implementation (n=25 Implementation Studies)

Intervention Characteristics	**Outer Setting**	**Inner Setting**	**Characteristics of Individuals**	**Process**
None	- Collaborative Practice Agreement with Physicians (n=10) - Pharmacist reimbursement (n=9)	- Provider training regarding POC testing, devices, interpretation, etc. (n=21) - Standardized protocol/pathway (n=20) - Private consultation area (n=6) - Assistance from pharmacy interns or assistants (n=3) - Check in meetings (n=1)	- Pharmacists can act on test results (i.e., prescribe treatment) (n=14)	- Selection of pharmacies more likely to be successful (n=17) - Done in a supportive jurisdiction (n=2) - Marketing or advertising to make patients aware of the service (n= 10)

Table 2.4. Identified Consolidated Framework for Implementation Research (CFIR) Constructs by Frequency and Study (n = 43 studies).

	Concept Frequency			
CFIR Domains (n = 5) **CFIR Constructs (n = 38)**	**Total**	**Category is a barrier (n)**	**Category is an enabler (n)**	**No. of citing studies (%)**
Intervention characteristics				24 (55.8)
Intervention Source	0	0	0	0
Evidence strength and quality	0	0	0	0
Relative advantage	34	0	34	16 (37.2)
Adaptability	3	0	3	3 (6.9)
Trialability	0	0	0	0
Complexity	20	5	15	12 (27.9)
Design quality and packaging	1	1	0	1 (2.3)
Cost	5	3	2	5 (11.6)
Outer setting				35 (81.3)
Patient needs and resources	42	13	29	21 (48.8)
Cosmopolitanism	17	8	9	14 (32.6)
Peer pressure	0	0	0	0
External policy and incentives	23	11	12	17 (39.5)
Inner setting				22 (51.2)
Structural characteristics	13	8	5	7 (16.3)
Networks and communications	2	0	2	2 (4.7)
Culture	0	0	0	0
Implementation climate				
Tension for change	0	0	0	0
Compatibility	7	5	2	5 (11.6)
Relative priority	0	0	0	0
Organisational incentives and rewards	9	0	9	7 (16.3)
Goals and feedback	0	0	0	0
Learning climate	0	0	0	0
Readiness for implementation				
Leadership engagement	1	1	0	1 (2.3)
Available resources	38	22	16	15 (34.9)
Access to knowledge and information	21	5	16	14 (32.6)
Characteristics of individuals				18 (41.9)
Knowledge & beliefs about the intervention	17	9	8	13 (30.2)
Self-efficacy	3	1	2	3 (6.9)
Individual stage of change	10	2	8	9 (20.9)
Individual identification with organisation	0	0	0	0
Other personal attributes	0	0	0	0

	Concept Frequency			
CFIR Domains (n = 5) **CFIR Constructs (n = 38)**	**Total**	**Category is a barrier (n)**	**Category is an enabler (n)**	**No. of citing studies (%)**
Process				7 (16.3)
Planning*	1	0	1	1 (2.3)
Engaging*	8	3	5	7 (16.3)
Opinion leaders	0	0	0	0
Formally appointed internal opinion leaders	0	0	0	0
Champions	0	0	0	0
External change agents	1	0	1	1 (2.3)
Executing	0	0	0	0
Reflecting and evaluating	0	0	0	0

3. Chapter 3. A Cross-Sectional Survey

Point-of-care Testing for Acute Upper Respiratory Tract Infections and Ordering of Laboratory Tests by Community Pharmacies in Alberta: A Cross-Sectional Survey

Authors

Omar E. Abdellatife, BScPharm, MSc Candidate[1].

Scot H. Simpson, BSP, PharmD, MSc[1].

Theresa J. Schindel, BSP, MCE, PhD[1].

Jody Shkrobot, BScPharm[1].

Mark J. Makowsky, BSP, PharmD[1].

Affiliations

1. Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta.

Corresponding Author

Mark J. Makowsky, 2-142E Katz Group- Rexall Centre for Pharmacy & Health Research

11361 87 Avenue, Edmonton, Alberta, T6G 2E1, Canada; Tel.: 780.492.1735; Fax:

780.492.1217; E-mail: makowsky@ualberta.ca

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Abstract

Background: Community pharmacists in Alberta have a broad scope of practice and may conduct point-of-care (POC) tests or order laboratory tests to assess or monitor acute and chronic medical conditions. However, little is known about the provision and pharmacists' experiences regarding these services.

Objectives: To characterize the frequency and types of POC tests and laboratory tests performed by community pharmacists. To explore pharmacist experiences, attitudes, self-efficacy, and perceived enablers and barriers to performing POC testing for acute upper respiratory tract infections (URTI) using the Theoretical Domains Framework (TDF).

Methods: Anonymous, online, cross-sectional survey with email invitations sent to 4,035 community pharmacists registered with the Alberta College of Pharmacy in February 2024. Descriptive statistics were used. Responses were compared between active providers (i.e., those currently providing strep throat, influenza, COVID-19, C-reactive protein, or Respiratory syncytial virus POC testing) and inactive providers as well as respondents working in urban and rural areas.

Results: Of 413 responses collected (response rate: 10.2%), 370 were included in the final analysis (45% < 40 years old, 65% female, 28% rural, 73% have additional prescribing authorization [APA]). Two-thirds of respondents (65%) were active providers. Strep throat testing was the most common POC test provided, performed by 60% of all respondents. Over half of respondents (59%) ordered lab tests, and of these A1C (73%) and TSH (70%) were most commonly ordered. Active providers were more likely to hold APA, be internationally educated, practice in a franchise pharmacy, and be confident in providing URTI POC testing than inactive providers (all $P<0.001$; univariate analysis). Inactive providers had significantly lower agreement

on important TDF domains including “Knowledge,” “Skills,” and “Organization” than active providers. There was no difference in the proportion of active providers compared by urban and rural status.

Conclusion: The results provide a snapshot of community pharmacist provision of POC testing and laboratory testing in Alberta. Active and inactive providers differed in their attitudes and confidence regarding URTI POC testing services. These findings could aid in the development of support tools and selection of strategies to foster implementation and sustainability of these services over time.

3.1.Introduction

Acute upper respiratory tract infections (URTI) including streptococcal pharyngitis, COVID-19, sinusitis, acute otitis media, influenza, COVID-19, and respiratory syncytial virus (RSV), among others, are a considerable health problem particularly, during the fall and winter seasons. For example, In the United States, non-invasive strep throat causes an estimated 5.2 million outpatient visits and 2.8 million antibiotic prescriptions annually among US persons aged 0–64 years[1]. The Centers for Disease Control (CDC) estimated that during the 2021-2022 season, there were approximately 9.4 million cases of influenza, 4.3 million visits to medical facilities due to influenza-related symptoms, 100,000 individual hospitalizations, and 4,900 deaths attributed to influenza[2]. Further in Alberta, Canada, during the first 2 months of the 2023-2024 season, there have been 11,105, 5,848, and 1,057 laboratory-confirmed cases of COVID-19, influenza, and RSV respectively, and many more who seek care with acute respiratory symptoms[3].

Appropriate assessment and management of patients presenting with upper respiratory symptoms is an important step in promoting antibiotic stewardship. Since the development of point-of-care (POC) tests for COVID-19, there has been increasing interest in the use of POC tests to distinguish between these conditions and implement appropriate treatment plans[4-6]. Excessive and inappropriate antibiotic use for viral infections contributes to possible side effects for the patient, the development of antimicrobial resistance, and increased healthcare expenditure[7-9]. Antibiotic therapy is considered appropriate for patients with pharyngitis symptoms, high clinical suspicion based on the use of clinical prediction rules (e.g., Centor or FeverPAIN score), and a positive test for GAS as it can reduce symptoms, prevent the spread and reduce complications[10-12]. While guidelines generally do not recommend routine use of influenza testing in primary care, they recommend antiviral treatment with oseltamivir within the first 48 hours for those at high risk of complications based on the presence of co-morbid conditions[13]. Recommendations for the use of Paxlovid are similar, for those with confirmed COVID-19 infection and comorbidities predisposing patients to poor outcomes[14].

Point-of-care testing is defined as tests that support clinical decision-making, which is performed by a qualified member of the practice staff near the patient and on any part of the patient's body or its derivatives, during or very close to the time of consultation, to help the patient and physician to decide upon the best-suited approach, and of which the results should be known at the time of the clinical decision making[15]. These tests can provide results in 5-15 minutes[16-19]. There is emerging evidence that suggests that when physicians use POC testing for Strep throat, fewer antibiotic prescriptions are provided. However, there are questions about the performance characteristics and cost-effectiveness of POC testing for respiratory tract infections in primary care. Therefore, uptake of POC testing for strep throat and influenza is not widespread by family physicians in Canada.

Family physicians have traditionally been one of the first points of contact for individuals with troublesome upper respiratory infection symptoms. However, in 2020, Statistics Canada indicated that approximately 4.6 million (15.5%) of Canadians aged ≥ 12 years, lacked regular access to a primary care provider[20]. These problems are even more acute in rural settings where only 8% of physicians are located[21]. Novel approaches are currently being devised in Canada to improve access to care, with a particular focus on healthcare provision by community pharmacists operating within their full scope of practice. As the most accessible healthcare providers[22], community pharmacists can help in achieving the triple aim framework of improving the experience of patients' care, improving the health of populations, and reducing per capita costs of healthcare[23].

In Alberta, community pharmacists' scope of practice has expanded since 2007 including the ability to prescribe prescription medications independently, offer vaccination and injection services, as well as view laboratory tests via a provincial electronic health record[24], and order laboratory tests when they are required[25]. This is supported by a pharmacy services compensation model[26]. Additionally, they have been involved in the detection or screening of acute and chronic health conditions using POC testing since 2018 when new standards of practice expanded to include POC testing[27]. POC testing for acute respiratory tract infections has been occurring in community pharmacies in Canada since 2014[28].

Several microbiological and biomarker-based rapid POC tests are available for strep throat, COVID-19, influenza, and RSV with molecular tests offering near-traditional lab test quality[29-31]. Research done before the COVID-19 pandemic showed us that community pharmacists can use POC rapid diagnostic tests to safely and effectively assess and manage patients with strep throat and influenza. Feasibility and acceptability studies suggest that these POC tests assist in clinical decision-making[32], improve pharmacists-physician collaboration, and have the potential to reduce unnecessary antibiotic use[17, 33, 34] and unnecessary GP visits[35, 36], subsequently contributing to antimicrobial stewardship. Moreover, it was convenient and accessible, and patients were highly satisfied with receiving this service in community pharmacies[37, 38].

Limited information is available on Alberta pharmacists' current provision of care, POC testing services, perceptions, experiences, and use of these services for acute upper respiratory tract infections[39, 40]. While a survey of Alberta pharmacists done by Khan et al. in late 2020 during the COVID-19 pandemic about their vaccination practices, found that 60% offer POC testing[40], information on which tests are being administered and their frequencies was absent. Furthermore, while we recently identified many barriers and facilitators to the implementation of these services into routine practice[41], there is limited information on implementation factors within the context of community pharmacies in Canada, particularly, Alberta[28, 42]. Finally, access to traditional laboratory results and the ability to order lab tests are also important for upper respiratory tract infections and in several other conditions as some therapies (e.g., antibiotic and antiviral medications) require dose adjustment in people with kidney disease. Given the ongoing challenges that Alberta's pharmacists appear to be facing around interpreting and ordering lab tests and a lack of information about the types of tests they are ordering, and experiences in lab testing relating to URTI there is a further opportunity to explore this aspect of care[43].

Therefore, in order to address gaps in healthcare delivery and evaluate the need for support tools to assist pharmacists in the provision of high-quality care, the main objectives of this survey study are to 1) Characterize pharmacists' current practices including the frequency and types of point-of-care and laboratory tests performed by community pharmacists. 2) Explore pharmacist experiences, attitudes, self-efficacy, and the perceived enablers and barriers to performing POC "test and treat" services for acute upper respiratory tract infections (URTI) in community pharmacies in Alberta, Canada using the Theoretical Domains Framework (TDF).

3.2. Methods

3.2.1. Study Design

This was an anonymous, online, quantitative cross-sectional survey of community pharmacists in Alberta using the REDCap electronic data capture tool hosted at the Women and Children's Health Research Institute (WCHRI) University of Alberta. We reported the results in this chapter according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines[44]. In designing the survey instrument, we considered the methodological guidance provided in the textbook by Dillman and Gideon[45, 46]. Ethics approval was obtained from the University of Alberta Research Ethics Board (#Pro00137768).

3.2.2. Survey Population & Recruitment:

The inclusion criteria for participation were community pharmacists, currently practicing in Alberta who have provided consent to be contacted for research purposes. Those who did not have valid email addresses or who were not currently employed in the community pharmacy setting were excluded. The contact email list of Alberta pharmacists who have previously agreed to be contacted for research purposes was obtained from the Alberta College of Pharmacy, then potential participants were recruited via an email invitation. The initial email invitation including an overview of the study's purpose and objectives as well as a link to the electronic survey delivered using the REDcap online survey platform was sent on February 22nd, 2024. Three reminder emails were sent at 1-week intervals after the initial email invitation. The survey was open for 6 weeks and closed on April 5th, 2024. Participation was voluntary and participants' consent to partake in the study was implied by completing the survey. At the end of the survey participants were invited to provide their contact information in a separate Google form for a chance to win a $100 pre-paid Visa gift card.

3.2.3. Survey Instrument

The survey instrument (**See Appendix D**.) was developed by the research team, incorporating questions based on the experience of the research team and the existing literature on surveys that explored Alberta's pharmacists' expanded scope of practice, (**See Appendix E**.) and the literature on POC testing for acute respiratory infectious diseases (**See Appendix F**.) as well as other POC literature (**See Appendix G**.). We paid particular attention to questions that appear to have theoretical grounding [e.g., Theoretical domains framework, COM-B, Behavior Change Wheel, Theory of Planned Behavior, and Consolidated Framework for Implementation Research (CFIR)].

The survey was divided into three main parts: 1) screening & demographic information of pharmacists and primary practice site characteristics, 2) services for patients with upper respiratory tract infections, point-of-care testing, and provision of clinical services, and 3) beliefs attitudes, self-efficacy and opinions regarding upper respiratory tract infection management, point-of-care and laboratory testing.

To measure beliefs, attitudes, self-efficacy, and opinions, about POC test and treat services for upper respiratory tract infections we asked active and inactive providers selected (n=30) questions based on the Determinants of Implementation Behaviour Questionnaire (DIBQ) [47-49]. The DIBQ is a valid and reliable generic questionnaire consisting of 93 items developed to assess and identify the potential determinants of healthcare professional implementation behavior following the 12-domain version of the TDF devised by Michie et al.[49-51]. Questions on this tool have also been mapped to the Capability-Opportunity-Motivation-Behaviour (COM-

B) model for behavior change[52-54]. The questions were solicited on a 5-point Likert scale. (1= “Strongly disagree”, 2= “Disagree”, 3= “Neutral”, 4= “Agree”, 5= “Strongly agree”).

3.2.4. Survey Validity and Reliability

The original survey questionnaire was assessed for content and face validity by considering both content-related and methodological aspects by experts in the field (n=4 pharmacists). The survey was then pilot-tested on a sample of 10 pharmacists. Cognitive interviews were conducted with practicing pharmacists during the pilot phase to assess the clarity, relevance, comprehension, and feasibility of the survey items[55, 56]. Then, the survey instrument was adapted accordingly before the commencement of distribution.

3.3. Data Analysis

We used descriptive statistics to summarize the demographics of the participants and the primary practice site characteristics. Categorical variables were reported as frequencies (percentages), and if needed were aggregated into new categories to facilitate sub-analysis and comparison with previous literature. Respondents’ demographics were compared with the Canadian Institute for Health Information 2022 Report[57] and the Alberta College of Pharmacy 2022-2023 annual report [58] using a Chi-square test to assess the representativeness of the study sample.

There were 4 main hypotheses. First, we hypothesized that strep throat testing was the most common type of POC test currently offered by Alberta pharmacists and determined this by examining the proportions responding affirmatively to questions about providing the various point-of-care tests.

Second, we hypothesized that rural pharmacists are less likely to perform acute respiratory infectious disease POC testing as compared to urban pharmacists. In order to explore differences between the characteristics of community pharmacists who were providing respiratory-based POC testing, pharmacists were categorized as active and inactive providers. Active providers are those who have provided point-of-care testing for strep throat, influenza, COVID-19, C-reactive protein or RSV in the past 3 months. Definitions of urban and rural were consistent with definitions used by Alberta Health[59]. This hypothesis was addressed by comparing the proportions of urban and rural pharmacists who have provided point-of-care testing for at least one upper respiratory tract infection in the past 3 months (i.e., active providers) using a Chi-square test.

Third, we hypothesized that rural pharmacists have lower self-efficacy in their ability to assess and manage patients with URTI. This hypothesis was tackled by generating a composite score indicating pharmacists' degree of confidence in care tasks for URTI management (11 questions) and then comparing scores between urban and rural pharmacists using the Mann–Whitney U test or the Kruskal Wallis test for continuous variables. This was done by adding the response value for each confidence question, creating a range from 11 (all items were selected "Not confident at all") to 55 (all items were selected "Very confident"). A respondent was excluded from the analysis if they did not provide an answer to one or more questions within the confidence category.

Finally, we hypothesized that 80% of pharmacists will agree/strongly agree that POC testing for acute respiratory conditions is within their scope of practice and that the frequency with which pharmacists provide POC testing services will be associated with questions relating to the TDF domains: Environmental context and resources, Social/professional role & identity, and Beliefs about capabilities. Composite scores were generated as appropriate for questions measured on Likert scales related to the same TDF construct. The scores then underwent a skewness and kurtosis test for normality.

Exploratory data analysis with box plots was conducted to depict the distribution of confidence and TDF domain scores between urban and rural pharmacists and active and inactive URTI POC testing providers. Comparative analysis using the Chi-square test or Fisher exact test for categorical variables and Mann-Whitney U test or Kruskal-Wallis test for continuous and ordinal variables as appropriate were conducted to test for between-group differences between 1) urban and rural pharmacists 2) active and inactive providers of URTI POC testing. We continued the same process for questions measuring other TDF domains because we are particularly interested in assessing differences in behavior between active and inactive POC testing providers. We measured the Cronbach's alpha (α) for items assessing each COM-B component.

3.4. Sample Size

As per the Alberta College of Pharmacists 2022-2023 Annual report there are a total of 6,128 registrants in the province[58]. Based on the total number of registrants, a priori recruitment target of 360 respondents has been set to achieve a 5% margin of error and a 95% Confidence interval. The sample size was determined using the Qualtrics online sample size calculator[60].

3.5. Results

3.5.1. Demographics and Practice Site Characteristics

A total of 413 responses were collected (response rate: 10.2%), where 4 were excluded because they did not provide any answer to the screening question, 8 were not working in a community pharmacy setting, 16 dropped out after answering the screening question, and 3 dropped out partway through the demographic questions resulting in 382 responses. Twelve dropped out after sufficiently completing the demographic section but before providing information on URTI and POC testing services. Therefore, a total of 370 usable responses were included in the final analysis (Completion rate: 9.2%).

The demographics and primary practice site characteristics are shown in **Table 3.1**. Among those who reported their age, about half (n=170; 46%) were under 40 years of age. The majority of participants were females (n=242; 65.4%) and had a median of 11(16) years of practice in the profession. Most had a bachelor's degree in pharmacy (n=281; 75.9%) and obtained their first pharmacy degree from the University of Alberta (n=200; 54%). Approximately three-quarters of pharmacists had an advanced prescribing authority (n=270; 73%) and almost all participants had the authorization to administer drugs by injection (n=367; 99.2%), while 88.4% (n=327) held a practitioner ID. Pharmacists were primarily practicing in an urban area (n=265; 71.6%), and in a banner and/or franchise pharmacy (n=153; 41.4%) followed by an independent pharmacy setting (n=88; 23.8%).

When the demographic characteristics were compared to pharmacists in Alberta[57, 58], our study participants were similar in terms of age and role at the practice site (P>0.05). However, our participants were more likely to be females, obtain their degree from a Canadian university, and hold an injection authorization and an APA, but less likely to practice in an urban location (P<0.001). (**Table 3.2.**)

3.5.2. Services for Patients with URTI, POC Testing & Provision of Clinical Services

A total of 370 respondents provided information regarding their practices for patients with URTI and point-of-care testing. For patients presenting with URTI or seeking advice regarding symptoms, 322 (87%) community pharmacists provided assessment to the patient. Most provided these services to 6-10 patients per week (91/322; 28.3%). The majority of these pharmacists frequently or very frequently provided OTC medication counseling (n=289; 89.8%), educated about self-care (n=283; 87.9%), helped patients decide when to seek help from another healthcare provider (n=267; 82.9%) or educated about when antibiotic treatment is and is not appropriate for RTIs (n=244; 75.8%) (**Figure 3.1.**). When these pharmacists were not able to deliver clinical services to individuals with symptoms of URTI most referred patients to their primary care physician (n=272; 84.5%), walk-in clinics (78.6%), emergency department (46.6%) or 811/HealthLink (n=92; 28.6%).

A total of 230 (62.2%) pharmacists answered that their primary practice site provides POC testing services, 269 (72.7%) provide respiratory or non-respiratory POC testing, and 240 (64.9%) pharmacists provide POC testing for URTI either in their primary or secondary practice site. Strep throat testing was the most commonly administered POC testing by pharmacists (n=221, 57.9%), followed by COVID-19 (n=98; 26.5%), influenza (n=22; 5.9%), while C-reactive protein and RSV testing were provided by a few pharmacists **(Figure 3.2.)**. During the COVID-19 pandemic, 277 (74.9%) pharmacists provided asymptomatic testing to patients. Active pharmacist providers were asked to provide the degree to which providing asymptomatic COVID-19 testing changed their willingness to perform the POC tests that they are providing. It appears that pharmacists were more willing to offer additional POC tests for strep throat and symptomatic COVID-19. Nevertheless, the general pattern showed no shift in pharmacists' willingness. (**Figure 3.2. Panel B**).

Among pharmacists who personally did not offer strep throat testing, 20.8% (n=31/149) expressed an intention to do so prior to the 2024/2025 respiratory season. Additionally, 11.8% (n=41/346) indicated an intention for influenza testing, 8.6% (n=31/362) showed an intention for RSV testing, 8.1% (n=22/270) had an intention for COVID-19 testing, and 7.2% (n=26/363) highlighted an intention for C-reactive protein testing (**Figure 3.2. Panel C**). In addition to that, if pharmacists received proper training on the appropriate technique, 80.1% (n=277) expressed personal willingness to conduct influenza testing. Similarly, 75.8% (n=113) indicated their willingness for strep throat testing, and 76.2% (n=276) of pharmacists showed a willingness to perform RSV testing. Furthermore, 73% (n=265) of pharmacists expressed their willingness to conduct C-reactive protein testing, and 70.4% (n=190) were willing to perform COVID-19 testing (**Figure 3.2. Panel D**).

Of the 270 pharmacists who held an APA, (34.1%) reported prescribing Paxlovid for high-risk patients with COVID-19, (21.9%) and (18.5%) prescribed oseltamivir for the prevention or treatment of clinically diagnosed or laboratory-confirmed influenza in the past 3 months. Of the 100 pharmacists who did not hold an APA, (64%) indicated their intention to obtain it within the next 3 months (**Figure 3.2. Panel C**).

Among pharmacists who did not prescribe Paxlovid for high-risk patients with COVID-19 infection (n=175) and oseltamivir for either prevention (n=204) or treatment (n=215) of influenza in the past 3 months, (40%) indicated their personal intention to prescribe Paxlovid, (30.9%) to prescribe for prevention and (41.9%) for treatment of influenza before the 2024/2025 respiratory illness season.

Finally, 39.5% (n=146) of all pharmacists reported providing point-of-care testing for other conditions (**Figure 3.3. Panel A**). A1C and lipids are the most commonly provided POC tests, whereas serum creatinine, International Normalized Ratio (INR), HIV, Hepatitis C, and neutrophils for clozapine were offered less frequently (**Figure 3.3. Panel B)**. The most commonly used testing platforms by active providers were rapid antigen tests with or without the BD Veritor plus analyzer and the Abbott ID Now.

Regarding the provision of other clinical services in the past 3 months, medication reviews (e.g., Comprehensive annual care plan [CACP] & Standardized medication management assessment [SMMA]), in-pharmacy blood pressure management, and injection services were provided regularly by pharmacists, and about (82.2%) of pharmacists were consulting Alberta Netcare daily. Travel health consultations and management of uncomplicated urinary tract infections were provided less frequently (**Figure 3.3. Panel A**).

Among the 327 pharmacists who held a practitioner ID, (n=219; 67%) were ordering laboratory tests at least every other month. The majority of these pharmacists were engaged in ordering laboratory tests including A1C, lipids, serum creatinine, electrolytes (e.g., Sodium, potassium), complete blood count (CBC), and thyroid stimulating hormone (TSH) for thyroid function (**Figure 3.3. Panel C**). Additionally, pharmacists were tasked with responding to a theoretical case regarding the frequency at which they conducted assessments of renal function on the Alberta Netcare electronic health record for certain medications. The purpose of these questions was to evaluate the necessity for community pharmacists to monitor Netcare for medications that either undergo or do not undergo renal clearance (**Figure 3.3. Panel D**). Almost half, (45.3%) of pharmacists who do not have a practitioner ID or who were not engaging in ordering laboratory tests (n=139) agreed/strongly agreed that they have the knowledge required to order laboratory tests, and about (44%) indicated the opportunity to order laboratory tests in their practice, whereas only (23.7%) and (21.6%) demonstrated motivation and intention to order laboratory tests in the next 3 months.

3.5.3. Active URTI POC Testing Providers

In terms of the training the 269 active providers (of URTI or other POC tests) received to perform POC testing, on-the-job training was the most frequently reported (58%), followed by self-study (52%), online continuing education (13%), Alberta College of Pharmacy Prescribed activity (10%), whereas training received as part of the undergraduate curriculum was reported less frequently mentioned by (7.1%), and (9.7%) of respondents reported no training (**Figure 3.4. Panel A**).

Fifty-three percent of the 269 active pharmacist providers reported using a written policy to guide POC testing services at their practice site, and of those providing POC testing for URTI the majority reported using a care pathway or protocol to guide care for patients with presumed strep throat (182/221; 82.4%), COVID-19 (60/98; 61.2%), and influenza (11/22; 50%). When 269 active providers (Resp or other) were asked about the assistance provided by the pharmacy team in the process of collecting and analyzing the test sample during the clinical encounter, (27.1%) indicated that pharmacy students were involved, while (5.6%) indicated that pharmacy technicians were involved in the POC testing process.

Regarding the drug information resources used by the 240 active pharmacist providers to guide the clinical decision-making of patients with URTI symptoms, Bugs & Drugs was the most commonly cited resource (78.3%), followed by Lexicomp (66.3%), Compendium of Pharmaceuticals and Specialties (54.2%), Therapeutic Choices (53.8%), and UpToDate (26.3%) (**Figure 3.4. Panel B**).

When the 240 active providers were asked about how they promoted the “test and treat” services for URTI, the predominant method of promotion reported by pharmacists was through verbal communication, with (60.4%) of respondents indicating this approach. Following this, corporate posters (39.2%), promotion on the official website (38.3%), social media posts (20.8%), in-store announcements (16.7%), and (19.6%) mentioned no formal promotional activities (**Figure 3.4. Panel C**). When inquired about the feedback they obtained from other health care providers (e.g., family physicians) regarding providing POC "test and treat" services in community pharmacies, about (50%) did not get much feedback, (25%) indicated predominantly positive feedback, (12.1%) received neutral feedback, and only (2.1%) encountered negative feedback.

3.5.4. Frequency and Actions of URTI POC Testing

For strep throat, the majority (121; 54.8%) of providers reported that in a typical week, 0 to 5 patients approach the pharmacy for strep throat testing. Most pharmacists (61.5%) responded that they actually conduct POC testing for about 75% or more of those patients. Conversely, pharmacists infrequently (47.5%) felt pressured in less than 25% of patient encounters, to prescribe antibiotic therapy when it was not clinically indicated. Pharmacists' responses varied when asked about the frequency of prescribing antibiotics or the anti-inflammatory benzydamine to patients (**Figure 3.5.**).

Out of the 22 pharmacists who provided influenza testing, the majority (68.2%) reported that 0 to 5 patients sought influenza testing at the pharmacy on a typical weekly basis. Twelve pharmacists (54.5%) reported conducting POC testing on less than 25% of those patients, felt pressured to prescribe antibiotic therapy when not clinically indicated, and (59%) reported prescribing antiviral therapy (i.e., Tamiflu) in less than 25% of patients.

For COVID-19 testers (n=98), most pharmacists (78.6%) cited 0 to 5 patients approached the pharmacy for COVID-19 testing every week. In less than 25% of those patients, (62.2%) of pharmacists reported conducting POC testing, and (81.6%) prescribed Paxlovid.

About (55%) of active URTI providers indicated that in more than 75% of patients, the request for URTI services occurred on a walk-in basis, and in less than 25% of patients, it occurred on an appointment basis. These consultations took place either during regular physician office hours or evenings and weekends for both adults and pediatrics (<18 years old) (**Figure 3.6.**).

3.5.5. Patient-related Reasons for Using URTI POC Testing

The most common reasons the 240 active providers reported for patients using the "test and treat" services were convenience and accessibility, reported by (80.8%) of pharmacists, followed by patients' inability to see their family physician (79.1%), getting faster results (67.5%), not having a family physician (65.8%), and after-hours care (54.1%) (**Figure 3.7.**).

Of 269 (resp or other) active providers who reported patients declining testing subsequent to being initially offered by them (n=166), (94%) noted that it occurred rarely to occasionally. Among these 166 providers, the following reasons were reported by active providers: patients' perception that the test is not necessary (59%), high cost of the test (53.6%), fear of the sample collection process (45.8%), the test will take time (36.1%), not trusting the test accuracy (34.3%).

3.5.6. Demographics, Frequency of POC Testing, & Confidence in URTI POC Testing

When comparing the demographics of active and inactive providers of URTI POC testing using a Chi-square test with an adjusted p-value, active providers are more likely to hold an advanced prescribing authority (OR 2.2; 95% CI:1.40-3.59), a pharmacy degree from a university outside of North America (OR 2.16; 95% CI 1.28-3.63), and practice in a franchise community pharmacy setting (OR: 10.0; 95% CI 3.96-25.4) (All $P<0.05$). When the proportion of active providers of URTI was compared between urban and rural pharmacists, the findings showed no significant difference ($P=0.48$; OR 1.2, 95% CI 0.74-1.9) (**Figure 3.8.**).

Pharmacists were asked to rank their degree of confidence on 11 questions related to care tasks for URTI management (**Table 3.3.**). The median score calculated for 309 analyzable responses was 46 (IQR [39-52]) pointing out high confidence towards URTI care tasks. However, active providers were significantly more likely to be confident than inactive providers (Median 49, IQR[43-75]; Active), (Median 38, IQR[32-47]; Inactive), (*P*<0.001) **(Figure 3.9.)**. The largest differences between groups were in confidence to perform a throat swab, perform a focused, physical assessment, analyze a sample using a rapid nucleic acid amplification test, and perform a nasal swab (**Figure 3.10.**)

Furthermore, in line with the third hypothesis, there was no significant difference in the confidence score between urban and rural pharmacists regardless of provider status (Median 46, IQR[38-52]; Urban), (Median 44, IQR[38-51]; Rural), (*P*=0.27) (**Figure 3.11.**)

3.5.7. Beliefs, Attitudes, Self-efficacy, and Opinions of POC Testing for URTI

Capability: Pharmacists were asked to rate their degree of agreement or disagreement to 3 questions based on the knowledge and skills domains of the TDF, which reflect the capability component in the COM-B model. In our sample, a total of 332 pharmacists responded to the one question measuring the domain "knowledge" aimed at assessing pharmacists' knowledge of POC "test and treat" service for URTI (**Table 3.4.**). When stratified by group, about (82.9%) of active URTI providers agreed/strongly agreed that they possess the knowledge necessary to deliver the service according to guidelines, whereas (26.2%) of inactive providers indicated similar agreement. A comparison between active and inactive providers revealed that the former group possessed a significantly higher knowledge level than the latter (*P*<0.001).

In two questions measuring the domain "skills" answered by 331 pharmacists, (61.3%) agreed/strongly agreed that they have the skills necessary to deliver the service to patients presenting with respiratory symptoms, whereas only (46.8%) agreed/strongly agreed that they have been trained to deliver it according to guidelines. The median summary score generated was 7 (IQR [5-8]) out of 10. When stratified by group, active providers had a significantly higher skill level than inactive providers (Median 8, IQR[7-9]; Active), (Median 4.5, IQR[2-6]; Inactive), (P<0.001) (**Figure 3.12.**).

Opportunity: Pharmacists were asked to rate their degree of agreement or disagreement to 14 questions based on five domains of the TDF (n=326-328) which all map to opportunity in the COM-B model (**Table 3.5.**). For example, regarding innovation characteristics, pharmacists agreed/strongly agreed that the POC testing component of the service helps clinical decision-making about treatment (89%), provides faster results compared to the standard laboratory (85%), promotes antimicrobial stewardship (81.2%), as well as the positive public perception about the service (80.4%). Conversely, (66.8%) and (63.5%) of pharmacists disagreed/strongly disagreed that the current compensation model is appropriate which occurs only in the presence of a prescribing event, and that the Alberta government provides sufficient financial support to deliver the service. Among the 14 questions, five questions measured the domain "Organization" or "Environmental context & resources" with respect to the availability of time, space, general resources, managerial support, and patients who would use the service. The median score calculated was 18 (IQR [15-20]) out of 25 suggesting that items within this domain were mostly considered as enablers to participants. A comparison revealed significantly higher agreement for active providers than inactive providers (Median 20, IQR[18-22]; Active), (Median 15, IQR[12-17); Inactive), (P<0.001) (**Figure 3.13.**).

Motivation: The items are depicted in (**Table 3.6.**). In two questions measuring the domain "Social/professional role and identity" answered by (n=330-331) pharmacists with a median score of 8 ([IQR 6-8]) out of 10, (78.5%) agreed/strongly agreed that delivering the service is within a pharmacist's scope of practice, while (49.1%) agreed/strongly agreed that it is their responsibility to deliver the service to patients presenting with respiratory symptoms. A comparison of scores revealed a statistical significance between active and inactive providers (Median 8, IQR[7-10]; Active), (Median 6, IQR[5-7]; Inactive), (P<0.001) (**Figure 3.14.**).

Two questions measured the domain "Beliefs about capabilities" (n=330). In one question, about (66.7%) of respondents agreed/strongly agreed that they feel confident delivering the service according to guidelines, and this was statistically significant between active and inactive providers (P<0.001). In the second question, about (62.4%) agreed/strongly agreed that they have control over delivering the service in their clinical practice, and this was statistically significant between active and inactive providers (P<0.001). The median raw score was 8 (IQR [6-9]) out of 10. A comparison of the domain's score between both groups revealed statistical significance indicating more capability of active providers (Median 8, IQR[7-9]; Active), (Median 6, IQR[5-8]; Inactive), (P<0.001) (**Figure 3.15.**).

In the domain "Emotions", (190/328; 57.9%) of respondents agreed or strongly agreed that they feel comfortable when and/or about delivering the service, and this was statistically significant between active and inactive providers indicating more comfort by active providers (P<0.001). Furthermore, (47%) of pharmacists agreed/strongly agreed that they feel concerned about personal exposure to COVID-19 and/or influenza when delivering the service.

Regarding the domain "Beliefs about consequences", pharmacists agreed/strongly agreed with seven statements evaluating the outcomes of delivering POC testing for URTI in community pharmacies (n=328-330). For example, patients will appreciate the service (90%), the service will make care more accessible and convenient for patients (90.6%), reduce the need for physician and/or emergency department visits (85.7%), generate additional revenue for my practice site (77.9%), improve pharmacists' professional satisfaction (69.3%), an overall worthwhile task (69.1%) and getting recognition from employers (42.9%) (**Table 3.6.**). The median score calculated was 28 (IQR[23-32]) out of 35 suggesting that all pharmacists highly perceived outcomes in this domain. When stratified by group, active providers had significantly higher agreement than inactive providers (Median 29, IQR[25-33]; Active), (Median 25, IQR[21-29]; Inactive), (P<0.001) **(Figure 3.16.**).

3.5.8. Strategies to Help Start or Sustain URTI POC Testing Services

In the strategies section (n=326), pharmacists rated their opinions on five strategies that can promote or sustain the uptake of the service in community pharmacies (n=326). For example, an evidence-based algorithm, or care pathway was found to be very helpful to essential (87.4%). This is followed by a training session (82.2%), the development of a more collegial atmosphere towards shared care between pharmacists and physicians (81.9%), the ability to upload POC test results into Netcare (78.2%), and working with an external practice facilitator who could help support service implementation (57.1%).

3.6. Discussion

3.6.1. Summary of main results

This survey characterized community pharmacists' provision of point-of-care testing for acute upper respiratory tract infections. It delved into their experiences, beliefs, attitudes, self-efficacy, as well as the perceived enablers and barriers. Additionally, it looked into pharmacists' participation in ordering laboratory testing to assess and monitor chronic conditions in community pharmacies. The survey instrument underwent content validation by experts in the field and was informed by the TDF, and the COM-B model for behavior change.

In our sample, about 65% of all pharmacists provided POC testing for URTI and strep throat testing was the most common, followed by COVID-19 testing, whereas influenza, RSV, and C-reactive protein testing were the least common highlighting a low uptake of these tests. There was no difference in the offering of respiratory POC testing services between urban and rural pharmacists. Additionally, around just under half of pharmacists provided POC testing for other conditions. Of them, A1C and lipids were the most common. Regarding lab testing, almost two-thirds of respondents ordered lab tests, and of them, A1C, TSH, and serum creatinine were the most frequently ordered tests.

In terms of implementation behavior, active and inactive providers significantly differed in their capability, opportunity, and motivation to provide URTI POC testing services. Differences were seen in their beliefs and attitudes about the service with respect to several TDF domains such as Knowledge, Skills, Environmental context and resources “Organization”, Social/professional role, Beliefs about capabilities, Emotions, and Beliefs about consequences, [51]. More importantly, differences were found in survey items related to possessing the knowledge and skills to deliver POC “test and treat” services as well as the availability of resources necessary for effective service implementation in community pharmacies with significantly higher agreement for active providers compared to inactive providers equating to the factors Capability and Opportunity in the COM-B framework. Furthermore, active providers were significantly more confident than inactive providers in care tasks related to URTI “test and treat” services ($P<0.001$), and this confidence was insignificant when compared between urban and rural pharmacists ($P=0.27$). A cross-comparison of individual survey items with previous literature is now provided.

3.6.2. Comparison with other literature

Our results regarding the overall proportion of respondents providing POC testing services are consistent with a survey of Alberta pharmacists related to administering vaccines and medications by injection done in 2020 where about (60%) of pharmacists provided POC testing[40]. Further, these findings are higher than those reported in another survey conducted in 2017 by Hughes et al. focused on HIV POC testing in Alberta, which revealed that approximately (25%) of pharmacists offered POC testing in their practice, however, we also found that strep throat testing was the most commonly reported[61].

A separate survey conducted during the pandemic on COVID-19 testing in the US found that (16.2%) provided testing[62]. More recently, Gallimore et al. surveyed pharmacy managers in the US and found only (17.1%) were providing POC testing most commonly for diabetes and lipids[63]. The findings in our survey showed that roughly three-quarters of Alberta pharmacists provided any kind of POC testing and almost two-thirds provided POC testing for URTI. Furthermore, strep throat testing was the most common, followed by COVID-19. This may indicate that the uptake of POC testing, particularly for strep throat is becoming more common in community pharmacies.

In this survey, two-thirds of all pharmacists and over 80% of active URTI providers indicated agreement that they possess the knowledge to deliver POC "test and treat" services for URTI according to guidelines. This aligns with findings from other survey research where about (80%), also indicated agreement that pharmacists possess the clinical knowledge necessary to provide POC testing services to patients[63, 64]. About three-quarters of pharmacists expressed agreement that POC testing for URTI is within their scope of practice which is similar to previous studies including a qualitative study on C-reactive protein, and one survey study on HIV and Hepatitis C with (63%) and (65%) agreement respectively[33, 65]. Almost (65%) of active URTI providers indicated agreement that they have been trained to deliver the service, while (61%) of inactive providers indicated disagreement with this statement which is similar to one survey study on infectious diseases where (63.4%) of pharmacists and student pharmacists indicated such disagreement[64]. Thus, providing training to inactive providers on conducting POC testing for URTI could encourage them to utilize the service more. Galimore et al.[63] showed that (76%) of pharmacy managers agreed that they are qualified to provide POC testing services to patients, whereas, in our survey, (63%) of all pharmacists and (81%) of active URTI providers indicated agreement that they have the necessary skills to deliver the service according to guidelines.

Few inactive providers had intentions to provide strep throat, influenza, COVID, RSV, or CRP testing but if they were properly trained, almost three-quarters of them were willing to provide each test. This corresponds with previous studies where in one survey study, approximately (70%) of pharmacists were willing to provide influenza and strep throat testing[64], and in another survey study, student pharmacists' interest and willingness to perform POC testing for strep throat, influenza significantly increased post training[66]. Additionally, in a qualitative study, pharmacists were enthusiastic and willing to perform sore throat "test & treat" services[35]. Moreover, survey research done in the US during & after the pandemic revealed a high willingness by pharmacists to provide COVID-19 testing[67-70].

About (83%) and (75%) of active URTI providers indicated feeling confident and comfortable when delivering the service to patients. Similarly, Brust-Sisti et al. identified that (75.6%) of pharmacists were comfortable conducting COVID-19 testing, and Mckerinan et al. demonstrated that student pharmacists' comfort and confidence in performing POC testing significantly improved post-training. The role of training in improving pharmacists' comfort and confidence in conducting POC testing was also discussed in previous research[33-35, 71]. Although in Brust-Sisti et al.'s survey (51.8%) of pharmacists not currently testing stated that they would be comfortable providing COVID-19 testing, (47%) of inactive providers in our survey expressed disagreement about being comfortable delivering the service to patients, as well as in Daunais et al.'s survey of infectious diseases where most individuals indicated that they did not feel comfortable discussing the clinical utility of POC testing with patients primarily due to their lack familiarity of training regarding the tests[72].

Regarding the beliefs about the consequences of the service, pharmacists in our survey indicated agreement that the service improves the convenience and accessibility for patients (90%), a point also supported by five studies[33, 35, 37, 73, 74]. Furthermore, consistent with others, we found that pharmacists believed that POC testing helps pharmacists' clinical decision-making about treatment (89%), [32-35, 75, 76], reduces unnecessary physician and/or emergency department visits (85.67%), [17, 35, 36, 76, 77], provides faster results (85%) compared to standard laboratory testing, [17, 18, 33], and promotes antimicrobial stewardship (81%) [17, 18, 33-36].

In terms of opportunity and the environmental barriers to implementation, around (63.5%) of all pharmacists in our survey, disagreed that there is sufficient financial support by the Alberta government to provide the service, and about (67%) disagreed that the current compensation model is appropriate which occurs only when a prescribing event occurs. The lack of remuneration for POC testing was also broadly highlighted in the literature that discussed several POC tests[33, 37, 62, 64, 67, 78, 79]. Addressing this barrier could help in the widespread implementation of this service. About (71%) of pharmacists in our survey indicated agreement in terms of the availability of sufficient space to deliver the service. Conversely, the lack of adequate space to provide POC testing was mentioned in three studies[62, 64, 67]. Pharmacists in our survey neither predominantly agreed nor disagreed that there is enough time to deliver the service. However, in Gallimore et al.'s survey, about (57%) of pharmacy managers disagreed that pharmacists will have the necessary time to provide POC testing services, and in one abstract pharmacists found strep throat testing in community pharmacies too time-consuming.

When it comes to strategies that could support POC testing implementation for URTI in community pharmacies, the availability of an evidence-based algorithm, or care pathway to help identify patients who should be treated, and appropriate treatment options was determined to be very helpful to essential by (87.4%) of all pharmacists. The presence of a protocol or care pathway was also noted to have contributed to the successful implementation of the service in two feasibility studies[32, 80]. In addition to that, training on the therapeutics of relevant respiratory tract infections as well as how to conduct and interpret POC testing was found to be very helpful to essential by (82.2%) of pharmacists. The importance of adequate training was extensively discussed in previous POC testing literature.[32, 34, 64, 67, 69, 72, 81].

3.6.3. Implications of Findings and Future Research

This theory-informed survey provided a snapshot of the provision of POC testing and laboratory testing in Alberta. Given that there is little research on POC testing that uses a theory to inform their findings, our survey could help guide the use of future theory-informed POC testing research that can characterize healthcare professional implementation behavior and identify factors that should be in place and areas of need to promote successful innovation uptake. Furthermore, the survey builds on a larger theory-informed scoping review project that characterized and mapped the literature on the implementation factors that facilitate or impede POC testing adoption for acute respiratory infectious diseases in community pharmacies. By characterizing the literature on the implementation factors as well as identifying Alberta pharmacists' experiences and attitudes about the service, the uptake of POC testing for acute upper respiratory diseases could be further enhanced. This could be achieved through the development of tools and the targeting of intervention functions that could foster the implementation and sustainability of POC testing services over time. For example, our findings suggest that there is a need for education (i.e., increasing knowledge); training (i.e., imparting skills); and incentivization (i.e., availability of reimbursement) to improve the adoption of URTI POC testing in community pharmacies, particularly among providers who are not currently offering the service[52]. Future theory-informed qualitative research should be devoted to exploring the actual experiences of URTI POC testing providers as well as inactive providers. This includes identifying what viable resources could enhance inactive providers' willingness to offer the service such as the role of training. Additionally, more experimental research aimed at establishing the actual benefit of the service in community pharmacies should be sought.

3.6.4. Limitations

The survey has a low response rate of (10.2%). Initially, the survey was sent to a census sample of 4,035 community pharmacists on the Alberta College of Pharmacy registrant list, however, only 370 usable responses were available for analysis. The survey lacks representativeness and caution should be used in generalizing the results to the entire population of Alberta pharmacists. Additionally, the survey has a nonresponse error; not every participant provided an answer to every question in the survey, and the results of participants who responded might differ from those who did not respond. Thus, the inability to obtain a response to all survey items along with the above reasons limits the generalizability of the survey findings. While we used a theoretically informed questionnaire, we only used a subset of selected items that we tailored towards URTI POC testing from the DIBQ based on the findings of the scoping review project and the researchers' experiences. Additionally, analysis of the raw scores calculated from the Likert scale items belonging to the same TDF domain treated ordinal data as interval data.

3.7. Conclusion

This survey provides a snapshot of community pharmacist provision of POC testing and laboratory testing in Alberta. Active and inactive providers differed in their capability, opportunity, and motivation regarding URTI POC testing services. These findings could aid in the development of support tools and the selection of strategies to foster the implementation and sustainability of these services over time.

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Table 3.1. Demographics and Practice Site Characteristics Overall and by Provider Status for URTI POC Testing.

Item		**Active no. (%) (n=240)**	**Inactive no. (%) (n=130)**	**Overall no. (%) (n=370),**	**P-Value**
Age	18-29 30-39 40-49 50-59 60+ Prefer not to disclose	32 (13.3) 80 (33.3) 62 (25.8) 35 (14.6) 12 (5) 19 (7.9)	15 (11.5) 43 (33.1) 33 (25.4) 22 (16.9) 6 (4.6) 11 (8.5)	47 (12.7) 123 (33.2) 95 (25.7) 57 (15.4) 18 (4.9) 30 (8.1)	NS
Gender	Male Female Prefer not to disclose	86 (35.8) 151 (62.9) 3 (1.3)	37 (28.5) 91 (70) 2 (1.5)	123 (33.2) 242 (65.4) 5 (1.4)	NS
Years as Pharmacist, Median (IQR)		11(16)	12 (16)	11 (16)	NS
Qualifications	Bachelor of Science in Pharmacy	180 (75)	101 (77.7)	281 (76)	NS
	Entry to Practice Doctor of Pharmacy	44 (18.3)	20 (15.4)	64 (17.3)	
	Post-Baccalaureate PharmD	12 (5)	7 (5.4)	19 (5.1)	
	Hospital Pharmacy Residency	3 (1.25)	1 (0.8)	4 (1.1)	
	Master of Science or MPharm	21 (8.8)	9 (6.9)	30 (8.1)	
	Doctor of Philosophy (PhD)	1 (0.4)	0	1 (0.3)	
	Other Degrees or Qualifications	21 (8.8)	15 (11.5)	36 (9.7)	
First Pharmacy Degree Location*	University of Alberta	121 (50.4)	79 (60.8)	200 (54.1)	**<0.05**
	Another university in Canada	28 (11.7)	24 (18.5)	52 (14.1)	
	A University in the USA	4 (1.7)	1 (0.8)	5 (1.4)	
	University outside of North America*	86 (35.8)	26 (20)	112 (30.3)	
	Missing	1 (0.4)	0	1 (0.3)	
APA*	Present Absent	189 (78.8) 51 (21.3)	81 (62.3) 49 (37.7)	270 (73) 100 (27)	**<0.05**
Injection Authorization	Present Absent	239 (99.6) 1 (0.4)	128 (98.5) 2 (1.5)	367 (99.2) 3 (0.8)	NS
Practitioner ID	Present Absent	214 (89.2) 26 (10.8)	113 (86.9) 17 (13.1)	327 (88.4) 43 (11.6)	NS
Certifications	Certified asthma educator	9 (3.8)	3 (2.31)	12 (3.2)	NS
	Certified diabetes educator	35 (14.6)	14 (10.8)	49 (13.2)	
	Certified tobacco educator	18 (7.5)	1 (0.8)	19 (5.1)	
	Certified bariatric educator	1 (0.4)	0	1 (0.3)	

Item		Active no. (%) (n=240)	Inactive no. (%) (n=130)	Overall no. (%) (n=370),	P-Value
	NAMS Certified Menopause practitioner	2 (0.8)	1 (0.8)	3 (0.8)	
	Hypertension Canada Certification Program	8 (3.3)	3 (2.3)	11 (3)	
	ISTM Certificate of Health Travel	15 (6.3)	4 (3.1)	19 (5.1)	
	Board of Pharmacy Specialties	4 (1.7)	3 (2.3)	7 (1.9)	
	Lifestyle medicine certification	2 (0.8)	0	2 (0.5)	
	Other	15 (6.3)	4 (3.1)	19 (5.1)	
Practice Location	Urban Rural Missing	175 (72.9) 64 (26.7) 1 (0.4)	90 (69.2) 39 (30) 1 (0.8)	265 (71.6) 103 (27.8) 2 (0.5)	NS
Pharmacy Type*	Independent pharmacy	52 (21.7)	36 (27.7)	88 (23.8)	**<0.05**
	Corporate/chain pharmacy	34 (14.2)	29 (22.3)	63 (17)	
	Banner	35 (14.6)	25 (19.2)	60 (16.2)	
	Franchise*	87 (36.3)	6 (4.6)	93 (25.1)	
	Mass merchandiser/food store	31 (12.9)	34 (26.6)	65 (17.6)	
	Missing	1 (0.4)	0	1 (0.3)	
Hours per week spent at primary practice site	Part-time (<25 hours) Full-time (25-40 hours) Full-time (>40 hours) Missing	34 (14.2) 131 (54.6) 74 (30.8) 1 (0.4)	26 (20) 71 (54.6) 33 (25.4) 0	60 (16.2) 202 (54.6) 107 (28.9) 1 (0.3)	NS
Role at primary practice site	Pharmacy manager Staff pharmacist Other Missing	101 (42.1) 127 (52.9) 11 (4.6) 1 (0.4)	52 (40) 72 (55.4) 6 (4.6) 0	153 (41.4) 199 (53.8) 17 (4.6) 1 (0.3)	NS
No. of prescriptions dispensed per day	Less than 100	45 (18.8)	28 (21.5)	73 (19.7)	NS
	100 to 199	71 (29.6)	50 (38.5)	121 (32.7)	
	200 to 299	57 (23.8)	37 (28.5)	94 (25.4)	
	300 to 399	38 (15.8)	6 (4.6)	44 (11.9)	
	400 to 499	19 (7.9)	4 (3.08)	23 (6.2)	
	More than 500	10 (4.2)	5 (3.9)	15 (4.1)	
Overlapping pharmacists shifts	Yes	175 (72.9)	92 (70.8)	267 (72.2)	NS
	No	62 (25.8)	38 (29.2)	100 (27)	
	Missing	3 (1.25)	0	3 (0.8)	
A Technician at primary practice site	Yes No Missing	125 (52.1) 114 (47.5) 1 (0.4)	74 (56.9) 56 (43.1) 0	199 (53.8) 170 (45.9) 1 (0.3)	NS NS

Table 3.2. Data Representativeness.

		Data Collected	Canadian Institute for Health Information (CIHI) 2022 (54)	P-Value
Observations n (%)		370	4218	
Age	Age <40 Age 40-59 Age 60+	170 (45.9) 152 (41.1) 18 (4.9)	2055 (48.7) 1880 (44.6) 283 (6.7)	P=0.59
Role at Primary Practice Site	Pharmacy owner/manager Staff pharmacist Other	153 (41.4) 199 (53.8) 17 (4.6)	1693 (40.1) 2405 (57) 120 (2.8)	P=0.12
Female		242 (65.4)	2383 (56.5)	P<0.01
Pharmacy degree from a Canadian University		252 (68.1)	2390 (56.7)	P<0.01
Practice Location	Urban area	265 (71.6)	3707 (87.9)	P<0.01
		Data Collected	**Alberta College of Pharmacy 2022-2023 Annual Report (55)**	**P-Value**
Observations n (%)		370	6128	
Additional prescribing authority (APA)		270 (73)	3664 (59.8)	P<0.01
Authorization to administer drugs by injection		367 (99.2)	5038 (82.2)	P<0.01

Table 3.3. Confidence in providing "test and treat" (T&T) services for patients with upper respiratory tract infections (URTI) (n=320-325).

Survey item (α=0.92)	**Not confident/ slightly confident (%)**	**Somewhat confident (%)**	**Moderately/very confident (%)**
Gathering the patient history	9 (2.8)	25 (7.69)	291 (89.5)
Performing a focused physical assessment	73 (22.6)	72 (22.3)	178 (55.1)
Deciding when to refer patients to a physician or another healthcare provider	15 (4.6)	41 (12.7)	267 (82.7)
Deciding when to perform a point-of-care test	31 (9.6)	45 (13.9)	247 (76.5)
Performing a throat swab	63 (19.4)	38 (11.7)	224 (68.9)
Performing a nasal swab	78 (24)	48 (14.8)	199 (61.2)
Performing capillary blood sample via finger prick	48 (14.9)	47 (14.6)	228 (70.6)
Analyzing a sample using a rapid antigen detection test	35 (10.8)	29 (9)	260 (80.3)
Analyzing a sample using a rapid molecular test (e.g., Abbott ID Now	96 (30)	46 (14.4)	178 (55.62)
Discussing test results with patients (including their value and limitations)	34 (10.5)	31 (9.5)	260 (80)
Prescribing appropriate treatment	27 (8.4)	41 (12.8)	253 (78.8)

Note: items were measured on a 5-point Likert scale 1 “Not confident at all,” 2 “Slightly confident,” 3 “Somewhat confident,” 4 “ Moderately confident” 5 “ Very confident.” Numbers reported may not add to the total sample size because some respondents did not provide an answer.

Table 3.4. Items measuring the Capability component of the COM-B Model (n=331-332).

Survey item (α=0.94)	**Disagree/strongly disagree (%)**	**Neutral (%)**	**Agree/strongly agree (%)**	**TDF Domain**
I know how to deliver URTI T&T services according to guidelines.	70 (21.1)	56 (16.9)	296 (62)	Knowledge
I have been trained to deliver URTI T&T services according to guidelines.	109 (32.9)	67 (20.2)	228 (46.8)	Skills
I have the skills to deliver URTI T&T services to patients presenting with respiratory symptoms.	77 (23.2)	51 (15.4)	203 (61.3)	Skills

Note: items were measured on a 5-point Likert scale: 1 “Strongly Disagree,” 2 “Disagree,” 3 “Neutral,” 4 “Agree,” 5 “Strongly Agree”. Abbreviations used: T&T, “test & treat”; URTI, upper respiratory tract infections. Numbers reported may not add to the total sample size because some respondents did not provide an answer.

Table 3.5. Items measuring the Opportunity component of the COM-B Model (n=326-329).

Survey item (α=0.88)	**Disagree/strongly disagree (%)**	**Neutral (%)**	**Agree/strongly agree (%)**	**TDF Domain**
An URTI T&T service is compatible with daily pharmacist practice.	52 (15.9)	75 (22.9)	201 (61.3)	Innovation
As compared to other pharmacist clinical services (e.g., immunization) an URTI T&T service is simple to deliver.	93 (28.5)	86 (26.4)	147 (45.1)	Innovation
An URTI T&T service based on POCT provides faster results compared to standard laboratory testing.	6 (1.8)	43 (13.2)	278 (85)	Innovation
The point-of-care testing component of an URTI T&T service helps pharmacists' clinical decision-making about treatment.	6 (1.2)	30 (9.2)	292 (89)	Innovation
The point-of-care testing component of an URTI T&T service promotes antimicrobial stewardship.	17 (5.2)	45 (13.7)	267 (81.2)	Innovation
The Alberta Government provides sufficient financial support to provide URTI T&T services.	207 (63.5)	92 (28.2)	27 (8.3)	Socio-political context
The current compensation model for URTIT&T services (i.e., where reimbursement is provided from the Alberta Government only when a prescribing event occurs) is appropriate.	219 (66.8)	76 (23.2)	33 (10.1)	Socio-political context
There is enough time to deliver URTI T&T services in the pharmacy where I work.	123 (37.6)	84 (25.7)	120 (36.7)	Organization
There are sufficient potential patients who would use URTI T&T services in the pharmacy where I work.	27 (8.3)	66 (20.2)	234 (71.6)	Organization
All of the necessary resources to provide URTIT&T services are available in the pharmacy where I work.	95 (29)	62 (18.9)	171 (52.1)	Organization
There is sufficient space to offer URTI T&T services in my pharmacy	48 (14.7)	46 (14.1)	233 (71.3)	Organization
The management of the pharmacy where I work supports delivering URTI T&T services.	42 (12.9)	70 (21.5)	214 (65.6)	Organization
The public is positive about receiving URTI T&T services from a community pharmacist.	5 (1.5)	59 (18)	263 (80.4)	Patient
Other health care providers think I should deliver URTI T&T services in my practice.	35 (10.7)	194 (59.5)	97 (29.8)	Social influences

Note: items were measured on a 5-point Likert scale: 1 "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," 5 "Strongly Agree". Abbreviations used: T&T, "test & treat"; URTI, upper respiratory tract infections; POCT, point-of-care testing. Numbers reported may not add to the total sample size because some respondents did not provide an answer.

Table 3.6. Items measuring the Motivation component of the COM-B Model (n=328-331).

Survey item (α=0.86)	Disagree/strongly disagree (%)	Neutral (%)	Agree/strongly agree (%)	TDF Domain
Delivering URTI T&T services is within the scope of my practice as a pharmacist.	22 (6.7)	49 (14.8)	260 (78.5)	Social/professional role and identity
It is my responsibility as a pharmacist to deliver URTI T&T services to patients presenting with respiratory symptoms.	66 (20)	102 (30.9)	162 (49.1)	Social/professional role and identity
I am confident that I can deliver URTI T&T services according to guidelines.	51 (15.1)	59 (17.9)	220 (66.7)	Beliefs about capabilities
I feel comfortable about/when delivering URTI T&T services.	75 (22.9)	63 (19.2)	190 (57.9)	Emotions
I feel concerned about personal exposure to/contracting COVID-19 or influenza in delivering URTI T&T services.	80 (24.4)	94 (28.7)	154 (46.9)	Emotions
I have control over delivering URTI T&T services in my clinical practice.	50 (15.2)	74 (22.4)	206 (62.4)	Beliefs about capabilities
If/when I deliver URTI "test & treat" services:				
My patients will appreciate this.	2 (0.6)	31 (9.4)	296 (90)	Beliefs about consequences
I will get increased professional satisfaction.	31 (9.4)	70 (21.3)	228 (69.3)	Beliefs about consequences
It will reduce the need for physician and/or emergency department visits.	13 (3.7)	34 (10.4)	281 (85.7)	Beliefs about consequences
It will make care more accessible and convenient for patients.	6 (1.8)	25 (7.6)	298 (90.6)	Beliefs about consequences
I will get recognition from my employer.	72 (21.9)	116 (35.2)	141 (42.9)	Beliefs about consequences
This will generate additional revenue for my practice site.	11 (3.3)	62 (18.8)	257 (77.9)	Beliefs about consequences
Overall, I expect this to be a worthwhile task.	35 (10.6)	67 (20.3)	228 (69.1)	Beliefs about consequences

Note: items were measured on a 5-point Likert scale: 1 "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," 5 "Strongly Agree". Numbers reported may not add to the total sample size because some respondents did not provide an answer. Abbreviations used: T&T, "test & treat"; URTI, upper respiratory tract infections.

Figure 3.1. Pharmacists' Engagement in Counseling and Medication selection (n=317-320).

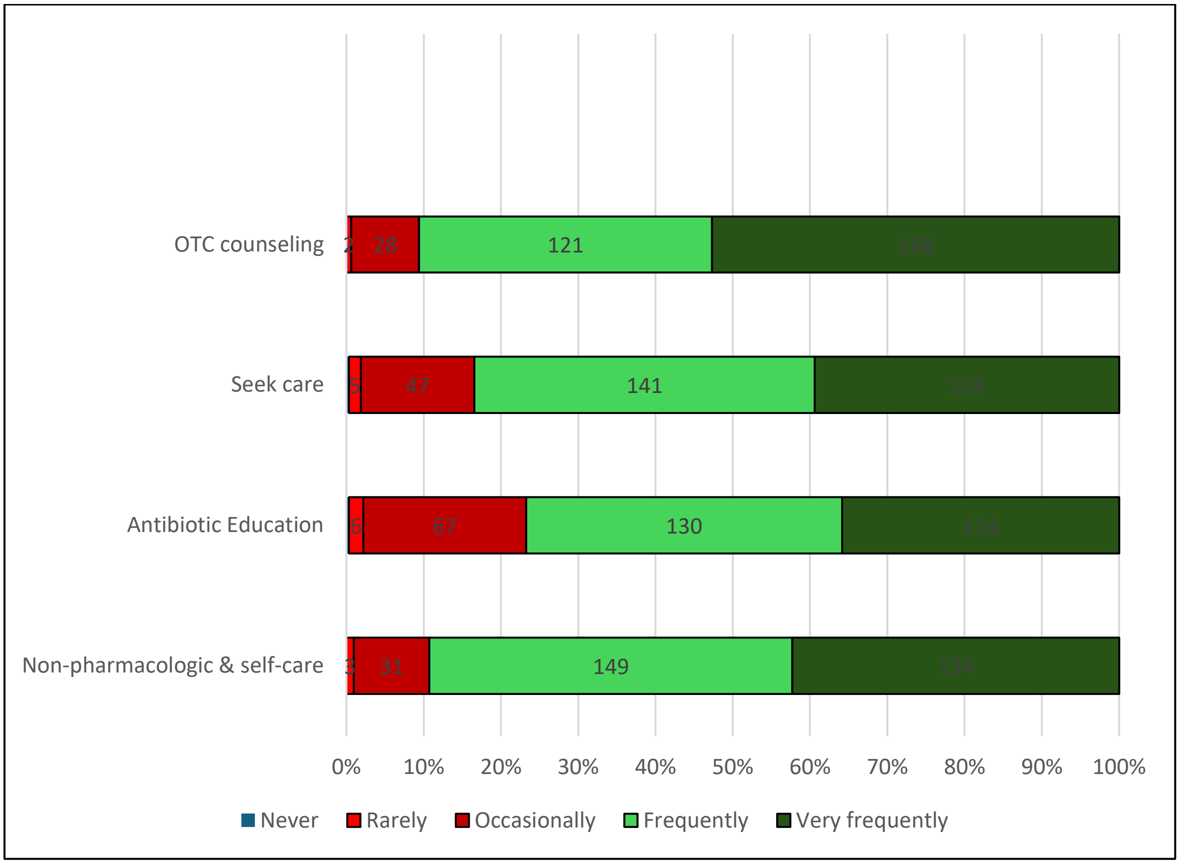


Figure 3.2. Provision and Willingness to Perform Point-of-Care (POC) Testing for Patients with Upper Respiratory Tract Infections (URTI).

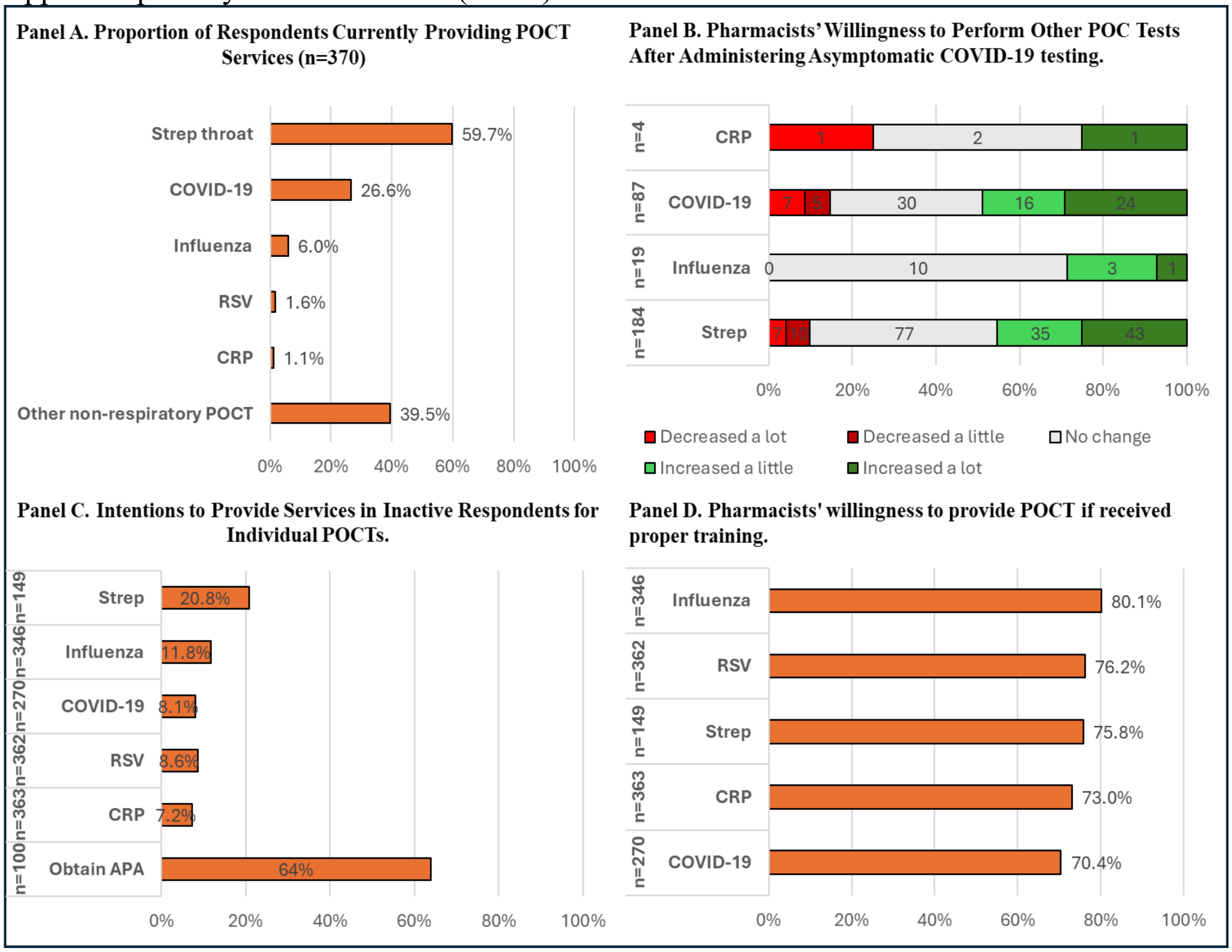


Figure 3.3. Pharmacists' Provision of Clinical Services: Netcare, Laboratory Testing, and POC Testing Administered for Other Conditions.

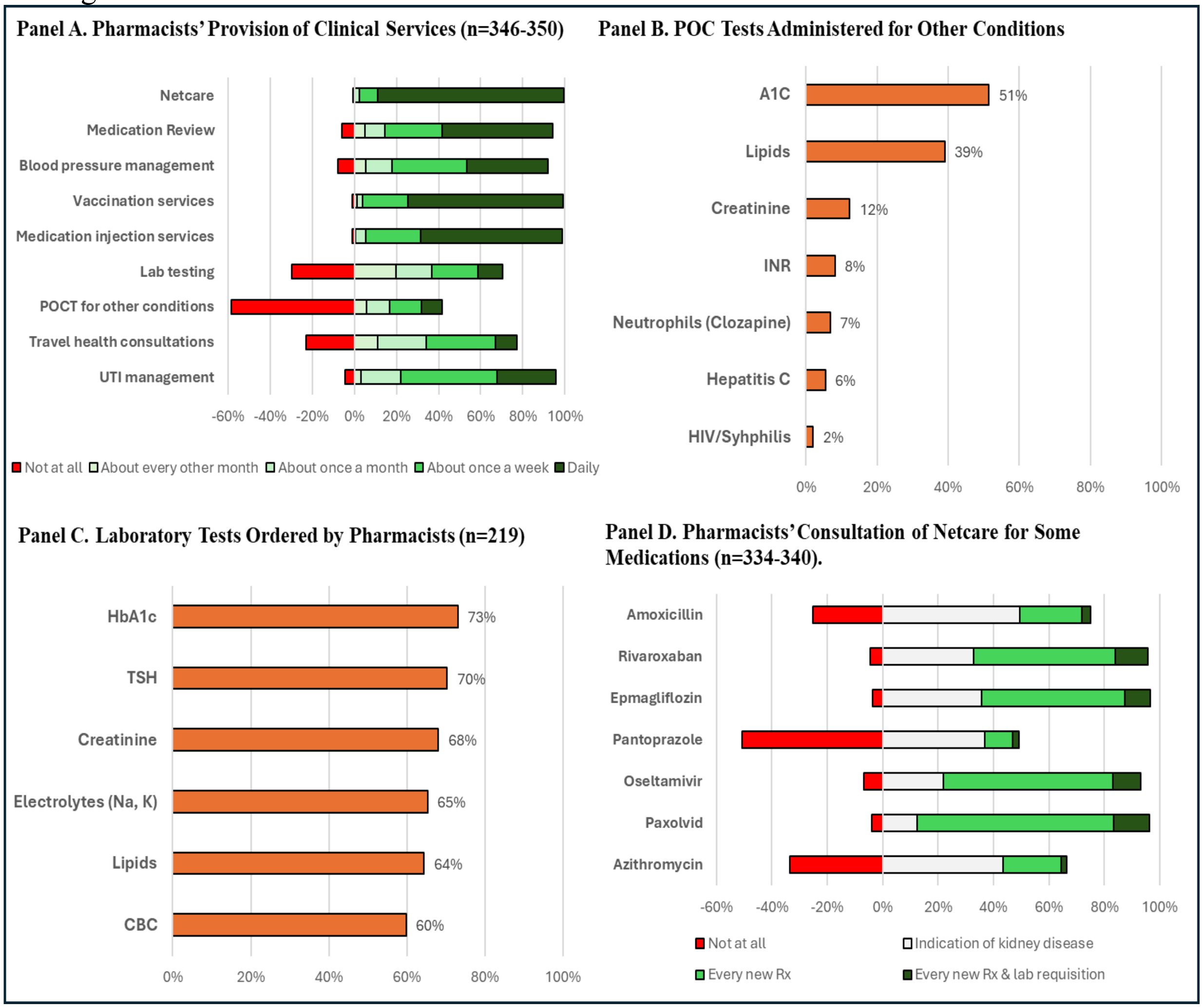


Figure 3.4. Training, Drug Resources, and Strategies for Pharmacists Providing POC Testing and URTI Management.

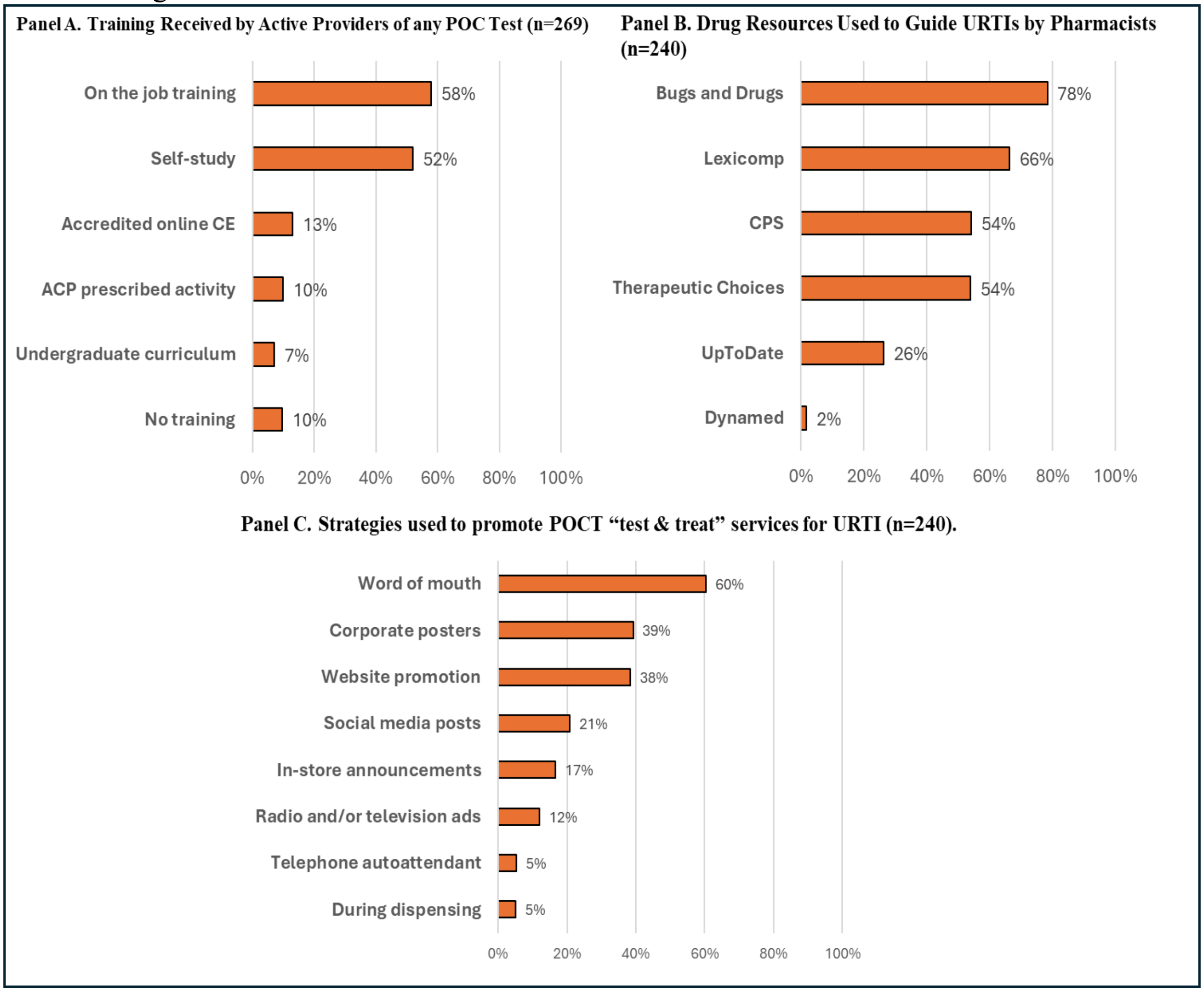


Figure 3.5. Frequency & Actions of POC Testing for Strep throat (n=221)

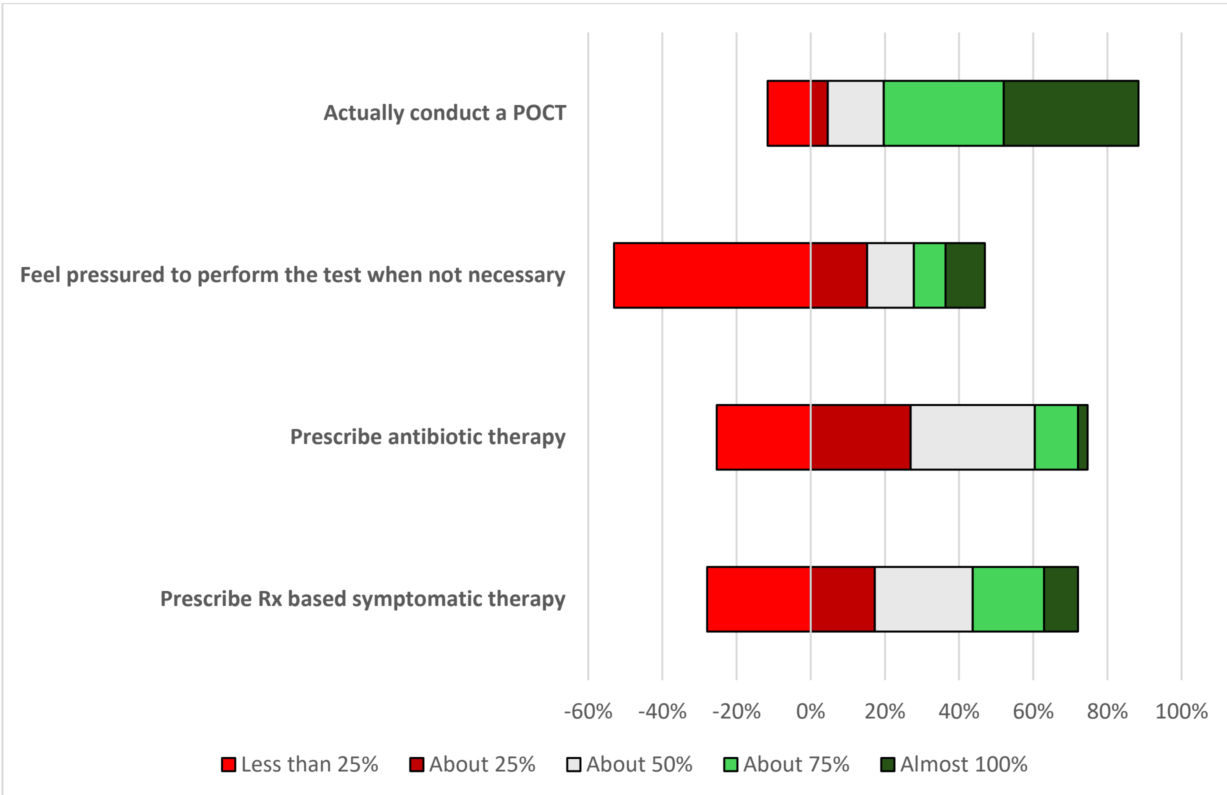


Figure 3.6. Percentage of Requests for URTI "Test & Treat" Services (n=240).

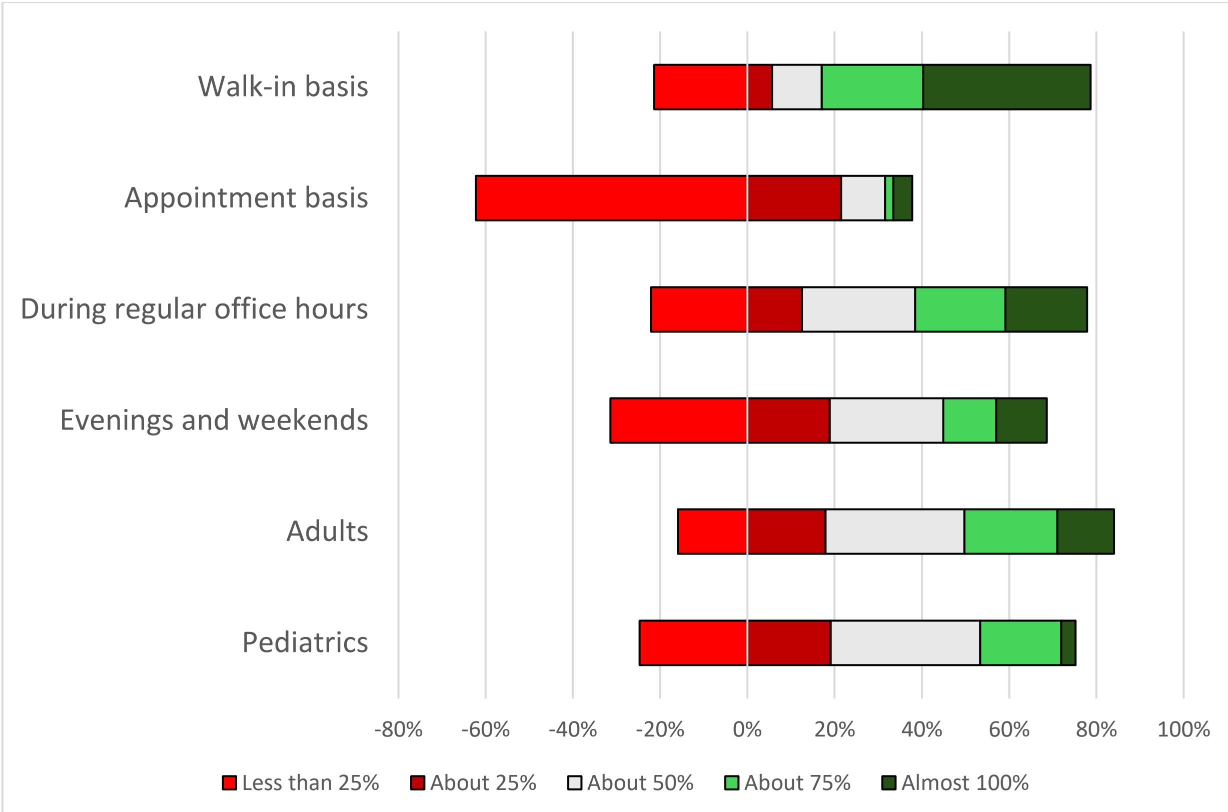


Figure 3.7. Reasons Patients Use to Get URTI “Test & Treat” Services in The Pharmacy (n=240).

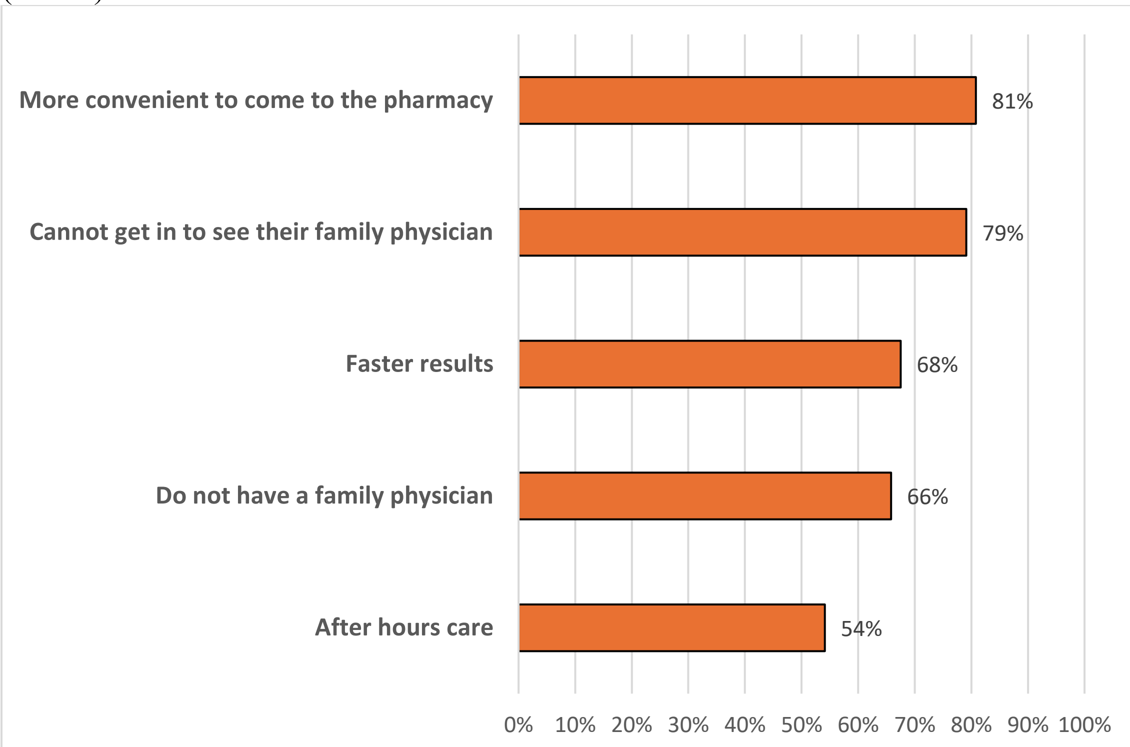


Figure 3.8. Provision of URTI POC Testing by Urban/Rural Status (n=368).

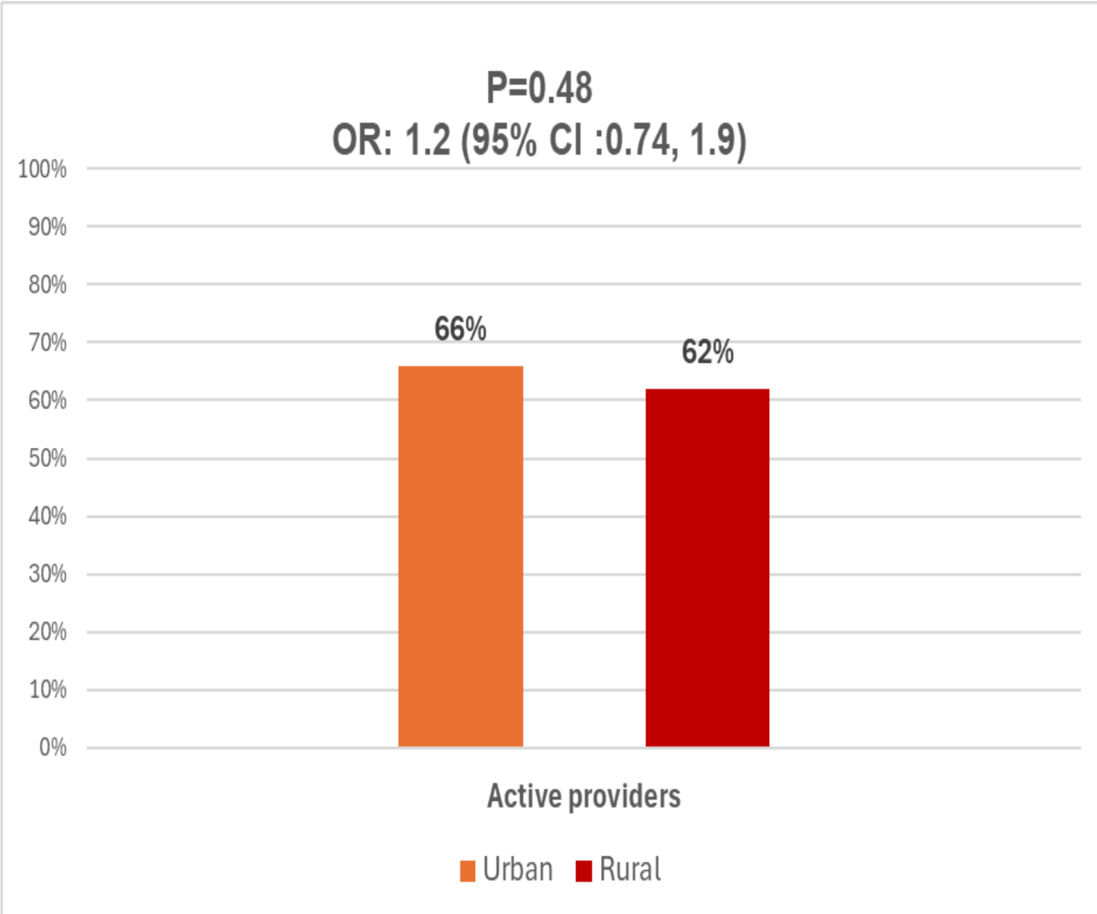


Figure 3.9. Overall Confidence in URTI Care Tasks by Provider Status (n=309)

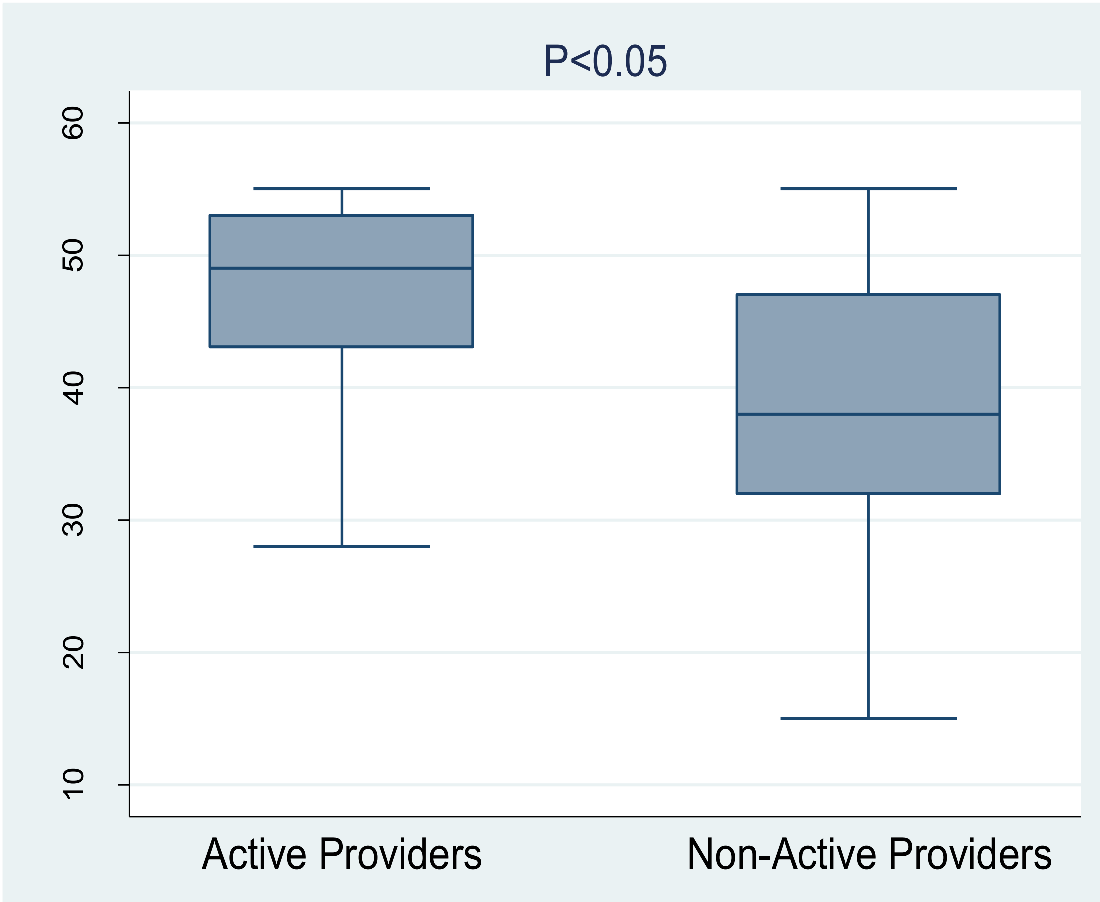


Figure 3.10. Differences in Confidence Between Active and Inactive Providers in Aspects of URTI POC testing.

Figure 3.11. Overall Confidence in URTI Care Tasks by Urban/Rural Status (n=308).

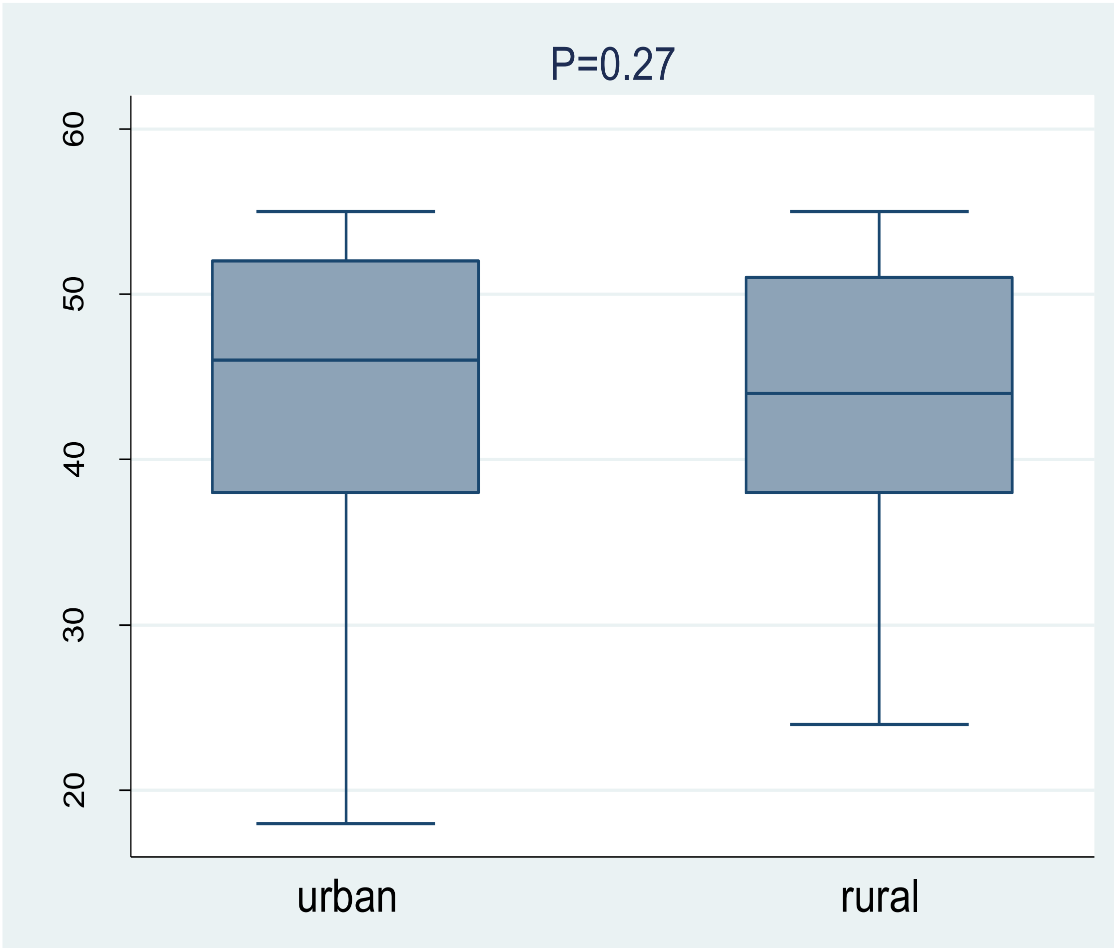


Figure 3.12. Skills Level by Provider Status (n=330).

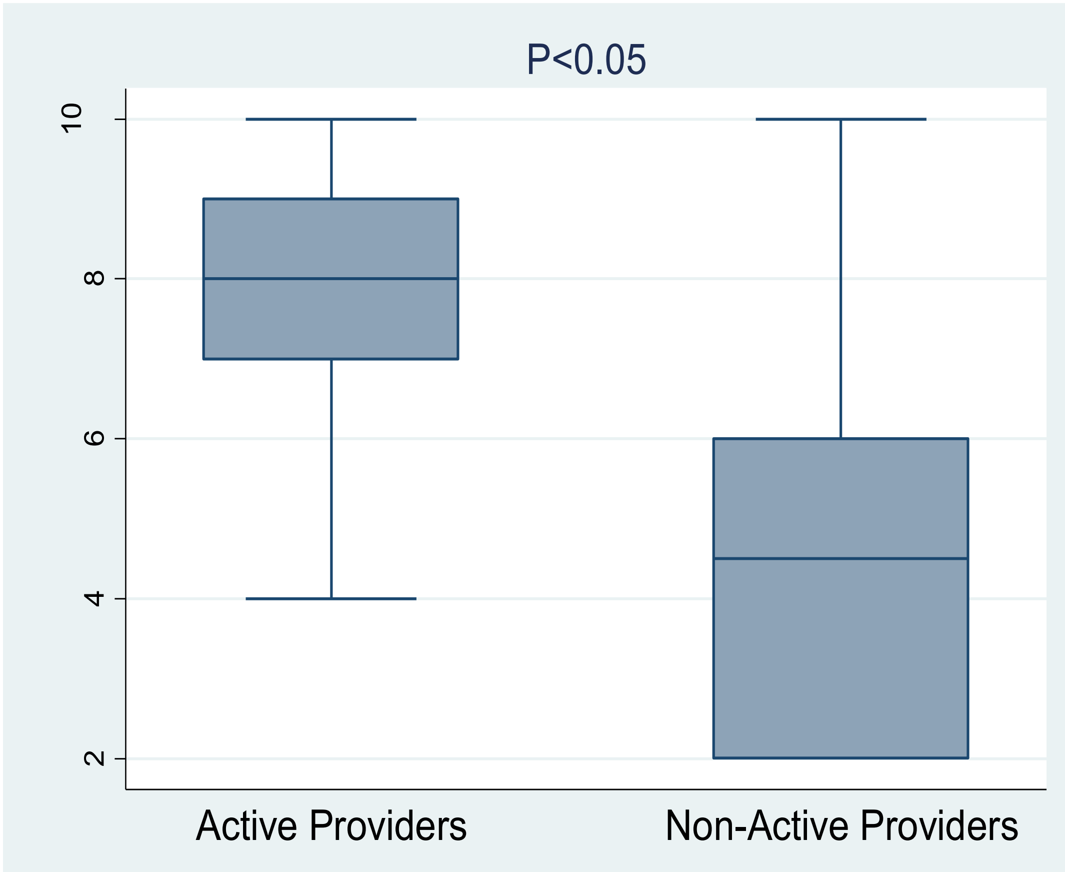


Figure 3.13. Overall Perceived Organizational Factors by Provider Status (n=319).

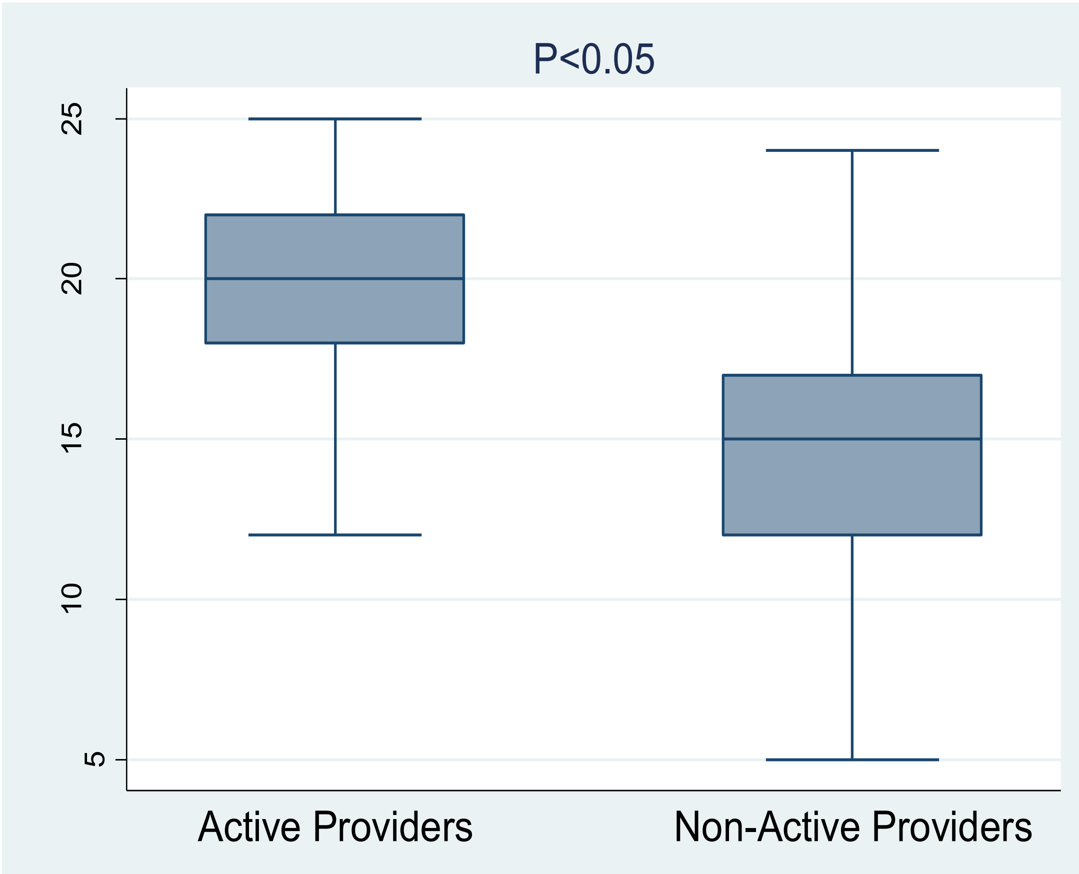


Figure 3.14. Social or Professional Role Score by Provider Status (n=329).

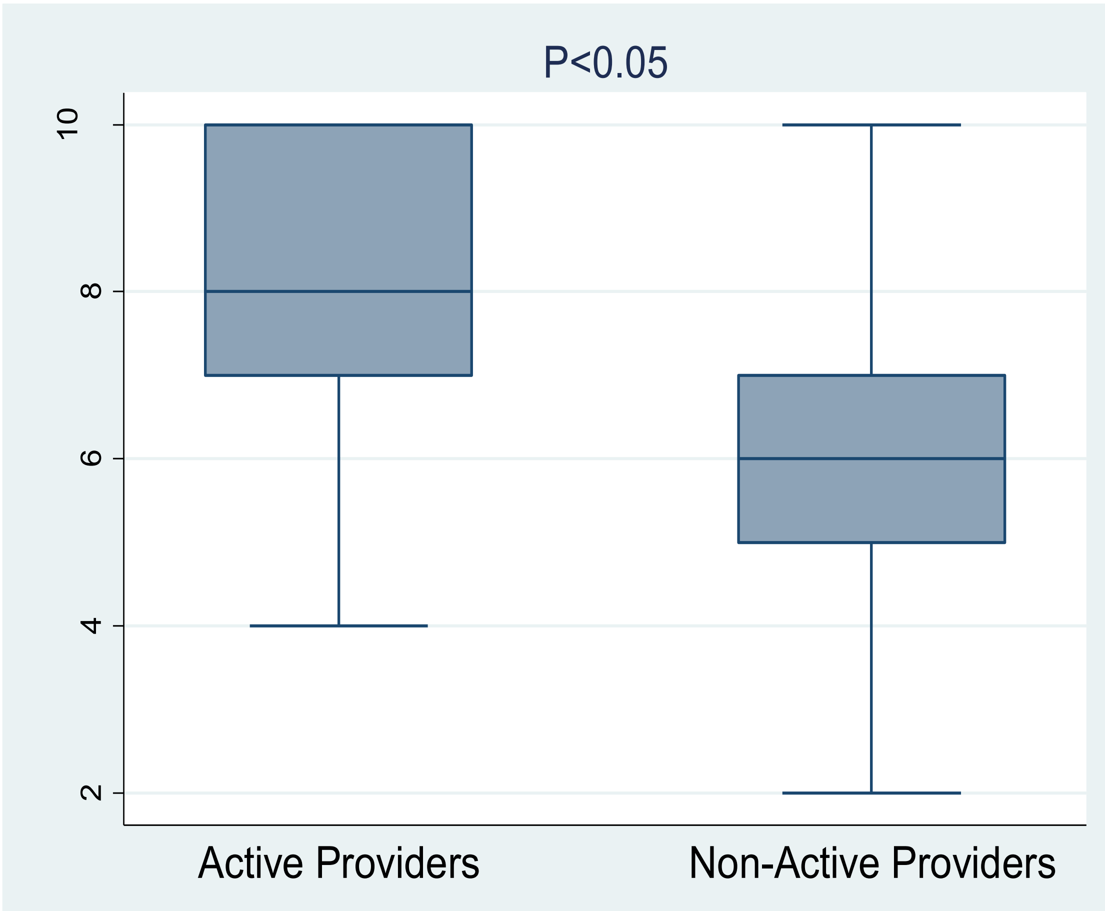


Figure 3.15. Beliefs about Capabilities Score by Provider Status (n=328).

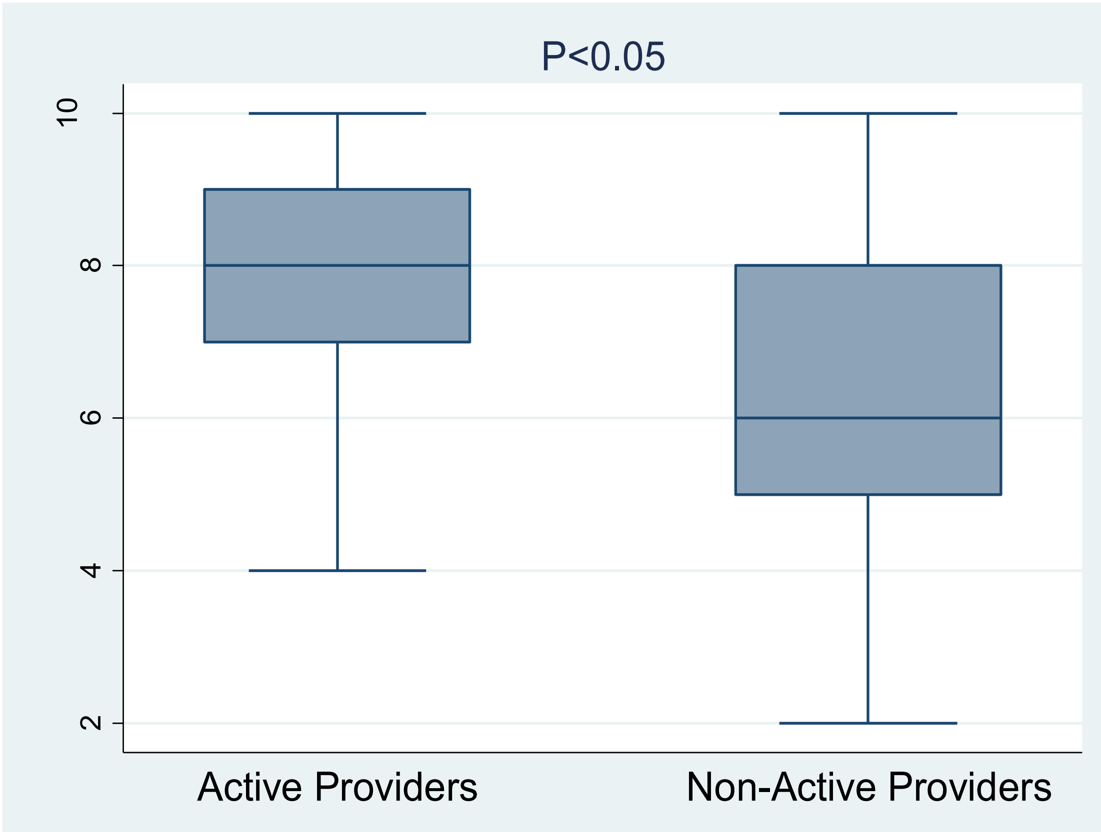
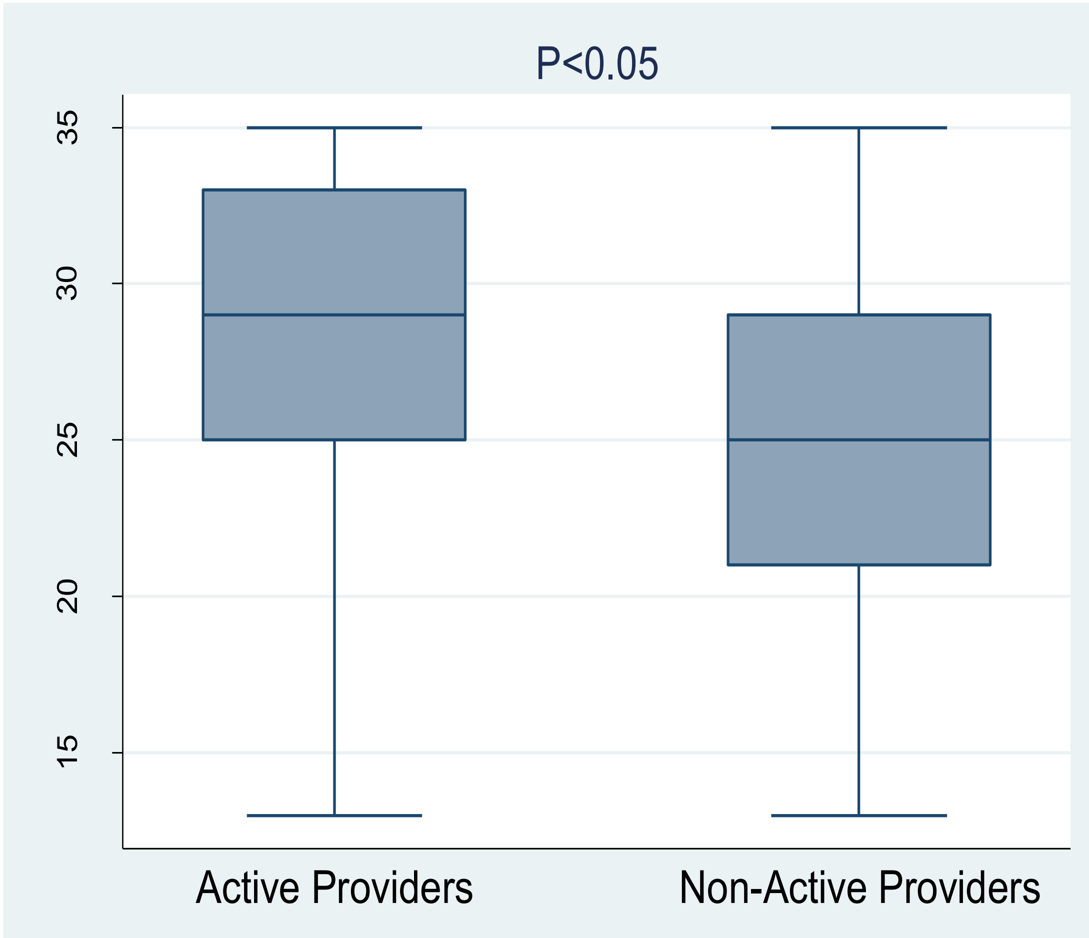


Figure 3.16. Beliefs about Consequences by Provider Status (n=330).



4. Chapter 4. Summary

4.1. General Discussion

Community pharmacists' scope of practice in Canada has expanded[1-3]. New strategies are being developed to enhance patient access to healthcare, specifically emphasizing the support of healthcare delivery by community pharmacists working within their full scope of practice. The broadened scope of practice aims to alleviate the pressure on the healthcare system without taking over the role of physicians[4]. As part of this expanded scope, they have been involved in assessing and prescribing for minor ailments, ordering laboratory tests, as well as increasingly meeting patients' needs in the detection or screening of acute and chronic health conditions using point-of-care (POC) testing[3, 5]. This includes POC testing for acute respiratory infectious diseases such as strep throat, influenza, and COVID-19.

Research has shown that the uptake of POC testing for respiratory infectious diseases aids in pharmacists' clinical decision-making, reduces unnecessary antibiotic use and general practitioner (GP) visits, promotes antimicrobial stewardship, and improves pharmacist-physician collaboration[6-11]. Nevertheless, the uptake is countered by several barriers that hinder implementation on a broader level. Awareness of implementation factors, which encompass both barriers and facilitators, reported in the contemporary pharmacy literature can help support the successful implementation of POC testing services in community pharmacies. A theory-informed contemporary review to understand the implementation factors was lacking. Furthermore, provided that community pharmacies in Alberta have the broadest scope of practice in Canada and the world, little information is available in the literature describing the provision and pharmacists' experiences regarding POC testing for respiratory infectious diseases and pharmacists' practices in ordering laboratory testing in Alberta.

Thus, to achieve the thesis's objectives, two methodologies were used: a scoping review, and a cross-sectional survey of community pharmacists in Alberta. By characterizing the literature on POC testing implementation factors as well as identifying Alberta pharmacists' experiences and attitudes about the service, the uptake of POC testing for respiratory infectious diseases could be further enhanced through the selection of strategies that can prompt and sustain the implementation process.

4.1.1. Factors Influencing POC Testing Implementation: A Scoping Review

In the first project of this thesis, we conducted a methodologically rigorous scoping review using the consolidated framework for implementation research (CFIR)[12]. The first objective of this review was to summarize the extent, range, and nature of research available on enablers and barriers of POC testing implementation for acute respiratory infectious diseases in community pharmacies and identify gaps for future research. The second objective was to synthesize identified implementation factors and identify their underpinning theoretical constructs by mapping them to the CFIR. Initially, our objective was to conduct a systematic review of implementation factors of all POC testing literature, then organize them at the individual level using the Theoretical Domains Framework (TDF) [13], but after we found a large volume of POC testing literature, we decided to narrow the project's scope to acute respiratory infectious diseases using a scoping review methodology, and the CFIR framework to categorize factors at the organizational & healthcare individual levels[12].

The review was conducted according to guidance from the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis[14] and is presented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) Checklist[15].

We included 43 studies. The 43 studies were published between 2014 and 2022 and just over half (22/43; 51%) were published between 2020 and 2022. The majority originated from the USA (n=24), and investigated strep throat testing (n=25/43). Thirty-six studies used quantitative methods[6, 7, 10, 11, 16-46] primarily surveys; 6 were qualitative, primarily semi-structured interviews;[8, 9, 47-50] and 1 study used mixed methods [51, 52].

Twenty-five (58%) of the included studies were implementation projects where POC testing was delivered to participants as part of the study. Implementation studies at the initial testing (n=23) or full operation phase (n=8) accounted for the majority of publications. Only four studies (n=4) used a theory or framework to inform their research[42, 48, 49, 51].

The 312 individual data items extracted collapsed into 124 categories using content analysis, then these categories were mapped onto 21 of the 38 CFIR constructs covering all 5 domains. The implementation factors were most commonly reported by study authors (n=20/43 studies), followed by pharmacists (n=17/43), or patients (n=13/43). The majority of included studies identified factors relating to the “Outer setting” (n=35), “Intervention characteristics” (n=24) “Inner setting" (n=22), and Characteristics of individuals (n=18) domains. Across studies, the 5 most commonly identified CFIR constructs were “Patient needs and resources” (n=21), “External policy and incentives” (n=17), “Relative advantage” (n=16), “Available resources” (n=15), “Access to knowledge & information” (n=14), and “Cosmopolitanism” (n=14).

A large range of facilitators and barriers to service implementation were reported in the included literature however, several implementation factors appeared to be important. These included, 1) Positive patient views and satisfaction 2) Available resources, 3) Collaborative relationships and support from physicians, 4) Presence or absence of reimbursement for POC testing as well as the many 5) Perceived advantages. These factors fell into the CFIR constructs of “Patient needs and resources,” “Available resources,” “Cosmopolitanism,” “External policy and Incentives,” and “Relative advantage” in the domains of Outer setting, Inner setting, and Intervention characteristics.

The review builds upon two previous reviews by Gubbins et al. that focused on POC testing for infectious diseases in community pharmacies in the USA and discussed key barriers to service implementation[53, 54]. Furthermore, it builds on 3 theory-informed reviews that used the CFIR to study implementation factors for novel/professional pharmacy services[55-57]. Our review is a comprehensive, up-to-date, methodologically rigorous review focused on identifying implementation factors identified in pre-implementation surveys, qualitative studies, descriptive implementation studies, and post-implementation surveys and interviews from the standpoint of various stakeholders. More importantly, our review is the first to use a theoretical framework and systematically map key stakeholders and individual and organizational level factors influencing acute respiratory infectious disease POC testing service implementation in community pharmacies using the CFIR.

This review identified a large volume of literature examining the barriers and facilitators to the implementation of POC testing services for acute infectious respiratory diseases in community pharmacies. Knowledge of the wide range of facilitators and barriers identified in this review can help pharmacy managers and researchers design strategies to support successful service implementation.

4.1.2. POC Testing Provision & Pharmacists’ Experiences: A Cross-Sectional Survey

The second project of this thesis was an anonymous, online, quantitative cross-sectional survey of community pharmacists in Alberta. The objectives were to characterize the frequency and types of POC testing and laboratory tests performed by community pharmacists, and then explore pharmacists' experiences, attitudes, self-efficacy, and perceived enablers and barriers when performing POC testing for acute upper respiratory tract infections (URTI) in community pharmacies in Alberta.

Community pharmacists who have provided consent to be contacted for research purposes were included. Email addresses were obtained from the Alberta College of Pharmacy and 4,035 email invitations were sent on February 22nd, 2024. The survey instrument was developed based on the experience of the research team, surveys that explored Alberta's pharmacists' expanded scope of practice, and the literature on POC testing for URTI and other conditions. The third part of this survey related to attitudes, barriers, and facilitators was theoretically informed by the TDF using the Determinant of Implementation Behavior Questionnaire (DIBQ) and the Capability-Opportunity-Motivation-Behavior (COM-B) model for behavior change[58-60]. The survey instrument underwent content validation with experts in the field of (n=4) pharmacists and was pilot-tested on a sample of (n=10) pharmacists.

We collected 413 survey responses (response rate: 10.2%), and 370 were included in the final analysis. Approximately three-quarters of pharmacists had an advanced prescribing authority (n=270; 73%) and 88.4% (n=327) held a practitioner ID. Pharmacists were primarily practicing in an urban area (n=265; 71.6%), and in a banner and/or franchise pharmacy (n=153; 41.4%) followed by an independent pharmacy setting (n=88; 23.8%).

When the demographic characteristics of respondents were compared to pharmacists in Alberta[61, 62] using a Chi-square test, our study participants were similar in terms of age and role at the practice site ($P>0.05$). However, our participants were more likely to be females, obtain their degree from a Canadian university, and hold an injection authorization and additional prescribing authorization (APA), but less likely to practice in an urban location ($P<0.001$).

When the demographic characteristics were compared between active and inactive providers of URTI POC testing using univariate regression analysis, active providers were more likely to hold an advanced prescribing authority, a pharmacy degree from a university outside of North America, and practice in a franchise community pharmacy setting (all $P<0.001$).

A total of 230 (62.2%) pharmacists answered yes that their primary practice site does provide point-of-care testing services, 269 (72.7%) provide respiratory or non-respiratory POC testing, and 240 (64.9%) pharmacists indicated provided POC testing for URTI either in their primary or secondary practice site. Strep throat testing was the most common (60%), followed by COVID-19 testing (26.6%), whereas influenza, RSV, and C-reactive protein testing were the least common. The proportion of active providers was insignificant between urban and rural pharmacists ($P=0.48$). Additionally, around (40%) of pharmacists provided POC testing for other conditions. Of them, A1C (51.4%) and lipids (39%) were the most common.

Regarding lab testing, (59.2%) of pharmacists ordered lab tests, and of them, A1C (73.1%), TSH (70.3%), and serum creatinine (68%) were the most frequently ordered tests.

In terms of implementation behavior, active and inactive providers significantly differed in their beliefs and attitudes about the service with respect to several TDF domains including Knowledge, Skills, Environmental context and resources "Organization", Social/professional role, Beliefs about capabilities, Emotions, and Beliefs about consequences. The key differences were found in survey items related to possessing the knowledge and skills to deliver POC "test and treat" services as well as the availability of resources necessary for effective service implementation in community pharmacies with significantly higher agreement for active providers compared to inactive providers equating to the factors Capability and Opportunity in the COM-B framework. Furthermore, active providers were significantly more confident than inactive providers in care tasks related to URTI "test and treat" services ($P<0.001$). Moreover, the comparison of confidence levels between urban and rural pharmacists did not show any significant difference ($P=0.27$).

Our results regarding the overall proportion of respondents providing POC testing services are consistent with a survey of Alberta pharmacists related to administering vaccines and medications by injection done in 2020 where about (60%) of pharmacists provided POC testing[63]. Further, these findings are higher than those reported in another survey conducted in 2017 by Hughes et al. focused on HIV POC testing in Alberta, which revealed that approximately (25%) of pharmacists offered POC testing in their practice, however, we also found that strep throat testing was the most commonly reported[64].

A separate survey conducted during the pandemic on COVID-19 testing in the USA found that (16.2%) provided testing[19]. More recently, Gallimore et al. surveyed pharmacy managers in the US and found only (17.1%) were providing POC testing most commonly for diabetes and lipids[65]. The findings in our survey showed that roughly three-quarters of Alberta pharmacists provided any kind of POC testing and almost two-thirds provided POC testing for URTI. Furthermore, strep throat testing was the most common with (60%) respectively, followed by COVID-19 at (26.5%). This may indicate that the uptake of POC testing, particularly for strep throat and COVID-19 is becoming more common in community pharmacies.

This survey provided a snapshot of community pharmacist provision of POC testing and laboratory testing in Alberta. Active and inactive providers differed in their attitudes and confidence regarding URTI POC testing services. These findings could aid in the development of support tools and the selection of strategies to foster the implementation and sustainability of these services over time.

4.2. Limitations

4.2.1. Limitations of Chapter 2

- Survey studies included in the scoping review may inflate reporting of implementation factors, particularly those collected at the pre-implementation phase (i.e., exploration, and preparation) because lists of potential enablers and barriers were provided to participants.
- Only 12 of the 43 studies were specifically designed to study implementation barriers and facilitators. Furthermore, researcher-implied implementation factors that were supported by data related to the study findings were included in the review.
- We used an aggregate analysis approach that has previously been criticized based on counting the number of studies and occurrences of implementation factors[66].
- The barrier and facilitator categories generated by the content analysis were not further collapsed to form an overarching category (e.g., lack of reimbursement is categorized as a barrier, while the presence of reimbursement is a facilitator, and they are each counted separately). This may result in the overrepresentation of certain factors.
- Regarding the CFIR mapping, it was at times difficult to map data to categories, as individual factors data may fit more than one of the synthesized categories and categories may fit more than one CFIR construct. This was tackled through careful interpretation of the findings and the establishment of decision rules until a consensus was reached between researchers.
- A formal quality assessment for the included studies was not conducted.

4.2.2. Limitations of Chapter 3

- The survey has a low response rate (10.2%).
- The survey sample resembles the population of community pharmacists in Alberta in terms only of age and role at the practice site[61, 62]. However, our survey respondents were more likely to be females, obtain their degree from a Canadian university, and hold an injection authorization and APA, but less likely to practice in an urban location.
- The survey has a nonresponse error; not every participant provided an answer to every question in the survey, and the results of participants who responded might differ from those who did not respond. Thus, the inability to obtain a response to all survey items along with the above reasons limits the generalizability of the survey findings.
- We only used a subset of selected items from the DBIQ that we tailored towards URTI POC testing based on the findings of the scoping review project and the researchers' experiences[58, 59].
- Two domains of the DIBQ in our study were evaluated based on just one question for each domain (Domain "Knowledge" & Domain "Patient"). A raw score could not be calculated for both domains.
- The analysis of the raw scores calculated from the Likert scale items belonging to the same TDF domain treated ordinal data as interval data.

4.3. Implications for Future Research, Policy, and Practice

Since there is limited research on POC testing that incorporates a theory to inform their findings, the results from both projects could guide the use of future theory-informed POC testing research that can characterize healthcare professional implementation behavior and identify factors that should be in place and areas of need to promote successful innovation uptake.

More qualitative research to study implementation should be conducted, particularly in rural community pharmacies, a setting where these services could have a larger health system impact. Furthermore, more qualitative research should be devoted to exploring the actual experiences of POC testing between active and inactive providers. This includes identifying what viable resources could enhance inactive providers' willingness to offer the service such as the role of training.

Given that the majority of included studies in the scoping review were primarily survey studies and little experimental research is present, future experimental research aiming to establish the benefit of POC testing programs for respiratory infectious diseases in community pharmacies should be conducted.

Since having a collaborative relationship with family physicians facilitates service implementation, more research exploring viable strategies to build successful relationships with family physicians should be conducted. Finally, more research is needed to create formal implementation frameworks relevant to clinical pharmacy services to promote successful uptake of POC testing services.

Our scoping review project could be used by future researchers and stakeholders who want to establish a POC testing program in community pharmacies to guide successful service implementation. Moreover, the findings of both projects could provide directions for integrating POC testing into the undergraduate pharmacy curriculum in order to effectively equip upcoming pharmacy graduates for the future and facilitate their seamless adjustment to the evolving scope of community pharmacy practice. The survey findings suggest that active and inactive providers differed in their attitudes and confidence towards these services. Overall, the use of POC testing was perceived by community pharmacists to be advantageous and supportive of antimicrobial stewardship as it aids in the appropriate use of antibiotics, and pharmacists' clinical decision-making, as well as reduces unnecessary clinic visits. Furthermore, it improves the convenience and accessibility for patients resulting in high satisfaction with service when offered in community pharmacies. However, the lack of reimbursement from the Alberta government seems to hinder the widespread provision of these services.

Our results suggest that there is a need for education (i.e., increasing knowledge); training (i.e., imparting skills to improve confidence); and incentivization (i.e., availability of reimbursement) to improve the adoption of URTI POC testing in community pharmacies, particularly among providers who are not currently offering the service. Additionally, among the resources or strategies that could help inactive providers start offering or active providers sustain the adoption of the service in community pharmacies include the availability of an evidence-based algorithm, or a care pathway, to help identify who should be tested and appropriate treatment options, the availability of a user-friendly or standardized communication, as well as the ability to upload POC testing results into the Alberta Netcare electronic health record. Having effective communication and promoting the service through proper marketing is a policy category that could further enhance service uptake in community pharmacies.

4.4. Conclusion

This thesis provided a comprehensive exploration of the implementation factors influencing POC testing implementation for acute respiratory infectious diseases in community pharmacies. The use of POC testing was perceived by community pharmacists to be advantageous and supportive of antimicrobial stewardship. Training community pharmacists is essential to ensure successful service implementation. Reimbursement availability plays a crucial role in facilitating widespread service adoption. Understanding pharmacists' attitudes and confidence toward these services is important for supporting the implementation process. Knowledge of the wide range of barriers and facilitators as well as capturing Alberta pharmacists' experiences could assist pharmacy managers and future researchers in the selection of appropriate tools and strategies to foster the implementation and sustainability of these services over time.

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Appendices

Appendix A: Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	4-5
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	31-32
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	5-6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	NA
Critical appraisal of individual	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the	NA

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
sources of evidence§		methods used and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6-7
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	21
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	7
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	7-8
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-11
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	11-14
Limitations	20	Discuss the limitations of the scoping review process.	14-15
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	15
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	15

Appendix B: Search Strategies

OVID Medline Search Strategy

1- ((rapid$ or same time or same visit or near patient or portable or handheld or hand-held) adj3 (test$ or analys$ or analyz$ or measure$ or assay$ or monitor* or device*)).mp.
2- (fingerprick or finger prick).mp.
3- (poc or poct or "point of care").mp.
4- point-of-care systems/ or point-of-care testing/
5- 1 or 2 or 3 or 4
6- Community Pharmacy Services/
7- Pharmacists/
8- (pharmacy or pharmacies or pharmacist?).mp.
9- 6 or 7 or 8
10- 5 and 9

OVID Embase Search Strategy

1. ((rapid$ or same time or same visit or near patient or portable or handheld or hand-held) adj3 (test$ or analys$ or analyz$ or measure$ or assay$ or monitor* or device*)).mp.
2. (fingerprick or finger prick).mp.
3. (poc or poct or "point of care").mp.
4. exp "point of care system"/
5. exp "point of care testing"/
6. 1 or 2 or 3 or 4 or 5
7. exp "pharmacy (shop)"/
8. exp pharmacist/
9. (pharmacy or pharmacies or pharmacist?).mp.
10. 7 or 8 or 9
11. 6 and 10

CINAHL Search Strategy

1. (rapid* or same time or same visit or near patient or portable or handheld or hand-held) N3 (test* or analys* or analyz* or measure* or assay* or monitor* or device*))
2. fingerprick or finger prick
3. poc or poct or "point of care"
4. (MH "Clinical Information Systems+")
5. (MH "Point-of-Care Testing")
6. S1 OR S2 OR S3 OR S4 OR S5
7. (MH "Pharmacy Service+")
8. (MH "Pharmacists")
9. pharmacy or pharmacies or pharmacist*
10. S7 OR S8 OR S9
11. S6 AND S10

Cochrane Library Search Strategy

#1 ((rapid* or portable or handheld
or hand-held) NEAR/3 (test* or analys* or analyz* or measure* or assay* or monitor* or device*))
#2 (same time NEAR/3 (test* or analys* or analyz* or measure* or assay* or monitor* or device*))
#3 (same visit NEAR/3 (test* or analys* or analyz* or measure* or assay* or monitor* or device*))
#4 (fingerprick or finger prick)
#5 (poc or poct or "point of care")
#6 MeSH descriptor: [Point-of-Care Systems] explode all trees
#7 MeSH descriptor: [Point-of-Care Testing] explode all trees
#8 OR #1-#7
#9 MeSH descriptor: [Community Pharmacy Services] explode all trees
#10 MeSH descriptor: [Pharmacists] explode all trees
#11 (pharmacy or pharmacies or pharmacist*)
#12 OR #9-#11
#13 #8 AND #12

Appendix C: Covidence Data Extraction Template

PREVIEW

General Information

Year of Publication

Publication type

Is the publication available as Full text or Abstract only?

Full text manuscript

Abstract only

Full text thesis

Other

Unique

Is the record/study unique? Answer no if the the paper a sub-study or part of a larger study with multiple other publications or other common authors (i.e., Count each "study" only once)

Yes

No

Unsure

Related Study ID

Enter the COVIDENCE ID for the related publications or Not Applicable

Country

Canada

USA

Australia

Japan

Portugal

Spain

France

UAE

Saudi Arabia

New Zealand

Vietnam

Malta

United Kingdom

Multinational

Other

Location

If specified, the location (City, Province, State) where the research was conducted. Enter "Not reported" if this information is not available.

Journal

JAPhA - Journal of the American Pharmacists Association

RSAP - Research in Social and Administrative Pharmacy

IJPP - International Journal of Pharmacy Practice

CPJ - Canadian Pharmacists Journal

IJCP - International Journal of Clinical Pharmacy

BMJ Open

SPJ - Saudi Pharmaceutical Journal

Value in Health

JPP - Journal of Pharmacy Practice

Exploratory Research in Clinical and Social Pharmacy

Currents in Pharmacy Teaching and Learning

JAC Antimicrobial Resistance

Pharmacy (Basel, Switzerland)

Integrated Pharmacy Research & Practice

American Journal of Pharmaceutical Education

Innovations in Pharmacy

The Journal of Antimicrobial Chemotherapy

Clinical Pharmacist

Journal of Pharmacy and Pharmacology

Thesis

Other

Language

English

French

Portuguese

Japanese

Other

Notes

Study Design

Methods

Study Design

Quantitative Study

Qualitative Study

Mixed methods Study

Other

Design Notes

Study design as described the the authors (e.g. "Focus group interviews", "One to one interviews")

Study Design

(Spotters Guide) Put the study into the most appropriate category

Descriptive Quantitative

Descriptive Qualitative

Descriptive Pilot/Feasibility Study

Descriptive Mixed Methods

Analytic, Experimental RCT

Analytic, Quasi Experimental RCT

Analytic, Observational, Cohort

Analytic, Observational, Cross sectional

Analytic, Observational, Case Control

Other

Data Collection Methods

Survey (Unspecified)

Survey (Online)

Survey (Mail)

Survey (Telephone)

Survey (In Person)

Semi-structured interview

Unstructured interview

Focus group interview

Prospective data collection

Retrospective chart review

Document review

Direct Observation

Analysis of administrative data

Other

Data Collection Methods

Survey

Yes

No

Not Applicable

Individual Interviews

Yes

No

Not Applicable

Focus Group Interviews

Yes

No

Not Applicable

Prospective Data Collection

Yes

No

Not Applicable

Retrospective Chart Review

Yes

No

Not Applicable

Document Review

Yes

No

Not Applicable

Direct Observation

Yes

No

Not Applicable

Analysis of Administrative Data

Yes

No

Not Applicable

Study Aims & Objectives

Study Aim

If a study "Aim" is provided, cut and paste it from the introduction or methods section. Start with "To..." Otherwise enter Not reported.

Study Objectives

Cut and Paste from the introduction or methods section.

Primary Aim or Objective related to Barriers or Facilitators?

Does the paper use the terms implementation factors, barriers and or facilitators (and/or their synonyms) in describing the study's purpose, objectives or research question(s)?

Yes

No

Unclear

Secondary Aims or objectives related to Barriers or Facilitators

Does the paper use the terms implementation factors, barriers and or facilitators (and/or their synonyms) in describing the study's purpose, objectives or research question(s)?

Yes

No

Not Applicable

Methodological Complexity

Categorize the complexity of methods used to identify implementation factors (barriers & facilitators) based on the framework described by Baker CDSR 2015; CD005470.

1. Low : A questionnaire survey of health professionals or informal discussion with, for example, a guideline group;

2. Moderate - Interviews and/ or focus groups with samples of health professionals specifically seeking information about barriers, or a survey supplemented by performance data;

3. High - Interviews and/or focus groups of health professionals supplemented by additional methods, for example observation.

Low

Moderate

High

Implementation Project

Is this an Implementation project?

Select "Yes" if a POC testing service was piloted, used, or integrated and delivered to real patients as part of the study.

Yes

No

Unclear

Implementation Stage

Categorize the Implementation Stage based on the methods section of the manuscript. Categories are based on Moullin BMC Health Services Research 2016;16:439 (with Adaptation from Garcia Cardenas RSAP 2018; 14:498)

1. Exploration phase: a service system, organization, research group, or other stakeholder(s) consider the emergent or existing health needs of the patients, clients, or communities and work to identify the best EBP(s) to address those needs, and subsequently decides whether to adopt the identified EBP.

2. Preparation phase: the primary objectives are to identify potential barriers and facilitators of implementation, further assess needs for adaptation, and to develop a detailed implementation plan to capitalize on implementation facilitators and address potential barriers.

3. Initial implementation phase: the intervention use is initiated in the system. Objective is ongoing monitoring of the implementation process. (e.g., pilot/feasibility studies)

4. Full Operation: The intervention use is initiated in the system as part of routine care. Objective is ongoing monitoring of the implementation process. (e.g., Process evaluations) (NOTE: We will consider prevalence surveys of a service as Operation phase e.g., COVID POCT testing survey after facilitating legislation passed)

5. Sustainment: ????

Exploration

Preparation

Testing/Initial Implementation

Full Operation

Sustainability

Unclear

Not Applicable

Study Category

1. Pilot implementation study where RESEARCHERS describe/discuss service B/F (DISCUSSION)

2. Implementation study where results are B/F identified by study PARTICIPANTS

3. Pre-Implementation survey exploring participant knowledge, attitudes, awareness, willingness or other related concepts

4. POCT prevalence or uptake surveys, that also measure participant knowledge, attitudes, awareness, willingness or other related concepts in a population where some may be testing and others not testing

5. Other

Pilot implementation study where RESEARCHERS describe/discuss service B/F

Implementation study where results are B/F identified by study PARTICIPANTS (surveys or interviews)

Pre-Implementation surveys or interviews exploring knowledge, attitudes, awareness, willingness or other related concepts

POCT prevalence or uptake surveys, that also measure knowledge, attitudes, awareness, willingness or other related concepts in a population where some may be testing and others not testing

Other

Study or Data Collection Period

E.g., Jan 1st, 2023 to Jan 31st 2023

Data Collection Duration

(e.g. 5 weeks, 6 months, Not reported)

Participant Sampling Strategy

Random

Census

Convenience

Purposive

Unclear

Other

Random Sampling

Yes

No

Census Sample

Yes

No

Convenience Sample

Yes

No

Purposive Sample

Yes

No

Unclear Sampling

Yes

No

Study Funding

Study funding reported

Yes

No

Study funding sources description

Raw Cut and Paste from Manuscript. Enter "Not reported" if this information is not available.

Study Funding

Non Profit

Grant Funded

Government Funded

Industry Sponsorship

Unfunded

University Funded

Not Reported

Not applicable

Other

Non Profit Funding

(e.g., Funded by a foundation)

Yes

No

Unclear

Not reported

Grant Funded Research

Funded by a major granting agency (e.g., NIH, CIHR, etc)

Yes

No

Unclear

Not reported

Government Funded

Yes

No

Unclear

Not reported

Industry Sponsorship

Yes

No

Unclear

Not reported

Unfunded

(i.e., Author report the work has no sources of funding)

Yes

No

Unclear

Not reported

University Funded

Yes

No

Unclear

Not reported

Other Funding

Yes

No

Unclear

Not reported

Funding not reported

Yes

No

Unclear

Not reported

Participant Characteristics

Study Population

The study participants were: (Select all that apply) (This may be different than the group reporting implementation factors.

Pharmacists

Pharmacy Technicians

Pharmacy Students

Other Pharmacy Staff

Patients, Public, Consumers

Physicians

Policy Makers

Nurses

Other

Study Population

Pharmacists

Yes

No

Pharmacy Technicians

Yes

No

Pharmacy Students

Yes

No

Other Pharmacy Staff

Yes

No

Patients/Public/Consumers

Yes

No

Physicians

Yes

No

Nurses

Yes

No

Policy Makers

Yes

No

Other Participants

Yes

No

No. of Participants

E.g., n=12 pharmacists, n=20 patients and n=3 physicians.

Mean Age

Gender (F/M)

Pharmacist Years of Experience

E.g., mean 13.1 (SD 11.1 years)

Surveys

Response Rate

E.g. for surveys: E.g., 25%, Not reported, Not applicable.

Survey Description

E.g., self administered, Postal or online, telephone)

Qualitative Methods

Qualitative Analysis Methods

Provide a brief description of the qualitative analysis methods. (e.g., Thematic analysis, Inductive data analysis. Independent analysis by two experienced qualitative researchers)

Community Pharmacy Setting

Community Pharmacy Setting Description

(e.g., Chain pharmacy, Not reported)

Pharmacy Type

Chain

Independent

Mass Merchandiser

Supermarket

Unclear

Not reported

Not Applicable

Other

Chain Pharmacy

Yes

No

Independent Pharmacy

Yes

No

Mass Merchandiser

Yes

No

Supermarket

Yes

No

Pharmacy Type Not Reported

Yes

No

Pharmacy Type - Not Applicable

Yes

No

Number of sites involved

FreeText (e.g., 1, Not reported, Not applicable)

Urban or Rural

Urban

Rural

Both

Unclear

Not Reported

Not Applicable

Other

Clinical POCT

Clinical POCT

Which of the following POCT were the focus of the study? (Select all that apply)

Strep Throat

Influenza

CRP

COVID-19

HIV

HepC

HepB

Syphillis (other STIs)

BG

HbA1c

Lipids

Scr/GFR

INR

Anemia

CBC

Celiac

Vitamin D

UTI

H.Pylori

BMD

Liver enzymes

Thyroid

PSA

Unspecified POCT

Other

Strep Throat

Yes

No

Influenza

Yes

No

URTI - CRP

Yes

No

COVID-19

Yes

No

Device Used

State the device(s) used. (or Not reported; Not applicable)

Service Description for Implementation Projects

Service Description

Describe in bullet list the key parts of the POC testing service. (Not reported; Not applicable)

Implementation Strategies Used

Implementation Strategies

Loosely based on Rodis J. JAPhA 2006;46;5:594. "Stepwise Approach to POCT Services". Extract from the Methods Section. Purpose is to better understand the 'Context" for Implementation factors identified.

Provider training regarding POCT testing, devices, interpretation, etc.

Standardized protocol/pathways

Collaborative Practice Agreement with Physicians

Selection of pharmacies more likely to be successful

Done in a supportive jurisdiction

Pharmacists can act on test results (i.e., prescribe treatment)

Marketing/advertising to make patients aware of the service

None reported

Not Applicable

Other

Training regarding POC testing and device(s)

Yes

No

Not reported

Not applicable

Standardized Protocol

Yes

No

Not reported

Not applicable

CPA with local physicians

Yes

No

Not reported

Not applicable

Selection of pharmacies more likely to be successful

Yes

No

Not reported

Not applicable

Done in a jurisdiction that was supportive

Yes

No

Not reported

Not applicable

Pharmacists could act on test results (i.e., prescribe therapies)

Yes

No

Not reported

Not applicable

Advertising to make patients aware of the service

Yes

No

Not reported

Not applicable

Framework/Theoretical Foundation

Framework Visibility

Was a theory/framework/model used to study implementation factors? Categorization based on Bradbury Jones Social Science & Medicine 2014;120:135. NOTE: Originally developed for qualitative research.

1. Seemingly absent: Theory is not mentioned at all

2. Implied: Theory may be mentioned or discussed in some detail (mainly in the background and/or introduction sections) and reference might be made to theorists in the field, but no explicit statement is made about the influence of theses on the study.

3. Partially Implied: Researchers explicitly locate their study within a particular theory but then seem to abandon efforts to link, apply or interpret their findings in that context. Theory is used only partially through the research process in relation to the research aims, interview questions or data analysis.

4. Retrospectively applied: Theory is considered at the end of a study as a means of making sense of research findings. Theory may be introduced as an afterthought

5. Consistently applied: Theory is consistently applied throughout the entire research process. Theory guides and directs the carries phases of the research process and can be tacked throughout a published article.

Seemingly absent

Implied

Partially Implied

Retrospectively applied

Consistently applied

Framework Name

Select All that Apply

CFIR

Diffusion of Innovations

TDF

COM-B

Ecological Model

Normalization Process Theory

PRECEDE-PROCEDE

Knowledge to Action Cycle

Garcia Cardenas

Not Applicable

Other

Framework Notes

Implementation Factors (Barriers & Faciliators)

Implementation Factors

1. Explicit: The paper explicitly identifies implementation factors, barriers or facilitators

2. Implied: The implementation factors identified are implied to facilitate or hinder implementation.

3. Both Explicit and implied implementation factors are present.

Explicit

Implied

Both

Implementation Factors Location

Section of the manuscript where Barriers & Facilitators are abstracted from.

Results

Discussion

Both Results & Discussion

Other

Group Reporting Implementation Factors

Researchers

Pharmacists

Pharmacy Technicians

Pharmacy Students

Other Pharmacy Staff

Patients, Public, Consumers

Physicians

Policy Makers

Nurses

Other

Group Reporting Factors

Researchers

Yes

No

Pharmacists

Yes

No

Pharmacy Technicians

Yes

No

Pharmacy Students

Yes

No

Other Pharmacy Staff

Yes

No

Patients, Public, Consumers

Yes

No

Physicians

Yes

No

Policy Makers

Yes

No

Nurses

Yes

No

Other

Yes

No

Raw Implementation Factors Reported

Main Barriers Identified (Overall)

For surveys, implementation factors are considered a barrier or facilitator if >= 50% of respondents agree that the factor influences implementation.

Main Facilitators Identified (Overall)

Main Implementation Factors Identified (Overall)

If implementation factors are reported, but it is not clear if they are Barriers or Facilitators enter them here.

Overall Study Results & Conclusions

Study Abstract

Cut and paste the entire abstract here.

Main Study Results

Results Summary

Cut & Paste the Results section from the ABSTRACT.

Conclusion

Authors Conclusion

Cut and paste the conclusion section from the discussion section.

Appendix D: Survey Tool with Branching Logic

Community Pharmacist Care for Acute Upper Respiratory Tract Infections including Point-of-Care and Laboratory Testing in Alberta. (PID: 7990)

17-05-2024 09:31

Instruments	
Instrument	**Form Name**
A survey of community pharmacist care for acute upper respiratory tract infections including point-of-care and laboratory testing	a_survey_of_community_pharmacist_care_for_acute_up

#	Variable / Field Name	Field Label *Field Note*	Field Attributes (Field Type, Validation, Choices, Calculations, etc.)
Instrument: **A survey of community pharmacist care for acute upper respiratory tract infections including point-of-care and laboratory testing** (a_survey_of_community_pharmacist_care_for_acute_up) Enabled as survey			
1	[record_id]	Record ID	text
2	[info_letter]	Welcome to the Community Pharmacist Care for Acute Upper Respiratory Tract Infections Survey Principal Investigator: Dr. Mark Makowsky, 2-142E Katz Group-Rexall Centre for Pharmacy & Health Research, Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta.Co-Investigators: Omar Abdellatife, BScPharm, MSc Student. Scot H. Simpson, BSP, PharmD, MSc. Terri Schindel, BSP, MCE, PhD, FCSHP. Jody Shkrobot, BScPharm Invitation: You have been invited to take part in this survey because you are a community pharmacist currently practicing in Alberta. The goal is to understand current practices in care for patients with symptoms of a respiratory tract infection such as strep throat, influenza, COVID-19, and respiratory syncytial virus (RSV). This includes "test and treat" services where pharmacists use point-of-care tests to inform decision making about prescribing treatment. The purposes of this study are to explore: • The frequency and types of point-of-care and laboratory tests pharmacists are providing. • Pharmacists' experiences, attitudes, and confidence, in offering "test and treat" services for respiratory tract infections.• Areas of need to provide and sustain these services. The results of this survey will be used to help us develop educational and support tools to assist pharmacy students and community pharmacists deliver patient care services for	descriptive

			people presenting with respiratory tract infection symptoms. Voluntary Participation: This survey is completely voluntary. It should take about 15-20 minutes to complete. The survey has 3 parts. The first part asks one screening question to ensure you are eligible to participate, then asks questions about you and your practice site. The second part asks questions about the services you provide to patients with respiratory tract infections, current practices relating to point-of-care and lab testing, and other clinical services that you provide. The third part asks about beliefs, opinions, and educational needs for providing services for patients with respiratory tract infections. The survey uses "branching" logic and you will be sent down a unique path based on your responses. Twelve questions are used to tailor the survey and are set to require a response. You may refuse to answer all other questions. If you decide that you don't want to answer the required questions or wish to withdraw midway through the survey, simply close the browser. Once your responses are submitted, it is not possible to withdraw from the study because the information is being collected anonymously. When you complete the survey, please hit the SUBMIT button. If you find that you are not able to complete the survey in one sitting, it also has a "Save and Return Later" feature enabled. If you select this option, you will be prompted to enter your email address to receive a link to your partially completed survey. This email address is not associated with or stored with your survey responses to preserve anonymity. Benefits & Risks: The information you share will allow us to better understand pharmacist perceptions on delivering clinical services for patients with acute respiratory symptoms and how to better support provision of these services. There are no known risks associated with participating in this study. Confidentiality, Anonymity & Data Storage: All responses are anonymous. The survey does not collect identifying information like your name, email address, or the IP address used. The REDcap software will send 3 reminders to complete the survey. Email addresses used for invitations or for the prize draw are not associated with or stored with your survey responses. The information that you will share will remain strictly confidential and will be	

		used solely for the purposes of this research. Survey responses are collected and stored in REDCap, which is hosted and supported on a secure server within the University of Alberta. The only people who will have access to the data are the investigators. We recommend that you close your browser after you complete the survey to help minimize the risk of a security breach and to ensure your privacy. Your data will be encrypted and stored on a password protected server at the University of Alberta and will be stored for a minimum of 5 years after finishing the study. Compensation: At the end of the survey, you will be invited to submit your email, name, and phone number to enter a draw for a chance to win a $100 pre-paid Visa gift card. Participation in the draw is voluntary. If you choose to participate in the draw, your information will not be associated with your responses to this survey. Consent: Your consent to participate in the study is implied upon completion of the survey. Contact Information: If you have any questions about this study, you can contact Dr. Mark Makowsky (principal investigator) - email: makowsky@ualberta.ca Tel: (780) 492-1735. The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board 3 (Pro00137768) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615. You may download a copy of this information letter for your records here.	
3	[header]	Eligibility Screening	descriptive
4	[screen]	Are you currently working as a pharmacist in a community pharmacy in Alberta?	radio, Required 1 Yes 2 No Stop actions on 2
5	[year_birth] Show the field ONLY if: [screen] = '1'	Section Header: *PART 1. DEMOGRAPHICS Questions about you...* What is your age range?	dropdown 1 Under 25 2 25 to 29 3 30 to 34 4 35 to 39 5 40 to 44

			6 45 to 49 7 50 to 54 8 55 to 59 9 60 to 64 10 65 to 69 11 70 and Over 12 Prefer not to disclose
6	[gender] Show the field ONLY if: [screen] = '1'	What is your gender?	radio 1 Male 2 Female 3 Other 4 Prefer not to disclose
7	[yr_pharm] Show the field ONLY if: [screen] = '1'	In what YEAR did you initially become registered as a pharmacist? (e.g., 2008)	text (number, Min: 1950, Max: 2024)
8	[qual] Show the field ONLY if: [screen] = '1'	Which of the following qualifications do you have? (Select all that apply)	checkbox 1 qual___1 Bachelor of Science in Pharmacy 2 qual___2 Entry to Practice Doctor of Pharmacy 3 qual___3 Post professional or post baccalaureate PharmD 4 qual___4 Hospital Pharmacy Residency 5 qual___5 Master of Science (MSc or MPharm) 6 qual___6 Doctor of Philosophy (PhD) 7 qual___7 Other Degrees or Qualifications
9	[qual_other] Show the field ONLY if: [qual(7)] = '1'	Please specify the other Degrees or qualifications you possess.	text
10	[fpd] Show the field ONLY if: [screen] = '1'	Where did you obtain your first pharmacy degree?	radio 1 University of Alberta 2 Another university in Canada 3 A university in the USA

			4 University outside of North America
11	[apa] Show the field ONLY if: [screen] = '1'	Do you have the Additional prescribing authorization on your Alberta practice permit?	radio, Required 1 Yes 2 No
12	[inj_auth] Show the field ONLY if: [screen] = '1'	Do you have the authorization to administer drugs by injection on your Alberta practice permit?	radio, Required 1 Yes 2 No
13	[pracid] Show the field ONLY if: [screen] = '1'	Do you have a practitioner identification number (PRAC ID)?	radio, Required 1 Yes 2 No
14	[cert] Show the field ONLY if: [screen] = '1'	Which of the following certifications do you have? (Select all that apply)	checkbox 1 cert___1 Certified asthma educator 2 cert___2 Certified diabetes educator 3 cert___3 Certified tobacco educator 4 cert___4 Certified bariatric educator 5 cert___5 NAMS Certified Menopause practitioner 6 cert___6 Hypertension Canada Certification program 7 cert___7 ISTM Certificate of Travel Health 8 cert___8 Board of Pharmacy Specialties (BPS) 9 cert___9 Lifestyle medicine certification 10 cert___10 Other 11 cert___11 None
15	[cert_other] Show the field ONLY if: [cert(10)] = '1'	Please specify the Other Certifications you possess.	text
16	[prac_loc]	Section Header: *Questions about your primary practice site...*	radio

	Show the field ONLY if: [screen] = '1'	Please indicate where your practice setting is located.	1 Metropolitan Calgary or Edmonton 2 Large urban population area (>100,000) not including Calgary or Edmonton 3 Medium urban population area (30,000 to 99,999) 4 Small urban population (1,000 to 29,999) 5 Rural area (less than 999)
17	[prim_site] Show the field ONLY if: [screen] = '1'	Which of the following best describes your primary practice site?	radio 1 Independent pharmacy 2 Corporate/chain pharmacy (e.g., Rexall, London Drugs) 3 Banner (IDA, Value Drug Mart, Pharmasave) 4 Franchise (e.g., Shoppers Drug Mart, Medicine Shoppe) 5 Mass merchandiser/food store (e.g., Costco, Safeway, Walmart)
18	[hours] Show the field ONLY if: [screen] = '1'	On average, how many hours per week do you spend at your primary practice site?	radio 1 Less than 8 hours 2 8-16 hours 3 17-24 hours 4 25-40 hours 5 More than 40 hours
19	[role] Show the field ONLY if: [screen] = '1'	What is your role at your primary practice site?	radio 1 Pharmacy owner or franchisee 2 Pharmacy manager 3 Staff pharmacist 4 Independent contractor 5 Other
20	[role_spec] Show the field ONLY if: [role] = '5'	Please specify your other roles	text
21	[rxperday] Show the field ONLY if: [screen] = '1'	Please estimate the average number of prescriptions dispensed per day in your primary practice site	radio 1 Less than 100 2 100 to 199

			3 200 to 299 4 300 to 399 5 400 to 499 6 More than 500
22	[pharm_overlap] Show the field ONLY if: [screen] = '1'	During a TYPICAL weekday at your primary practice site, is there more than one pharmacist on duty at a time (i.e., overlapping pharmacist shifts)?	radio 1 Yes 2 No
23	[tech] Show the field ONLY if: [screen] = '1'	During a TYPICAL weekday at your primary practice site, is there a pharmacy technician on duty?	radio 1 Yes 2 No
24	[resp_cc] Show the field ONLY if: [screen] = '1'	Section Header: *PART 2. Services for Patients with Respiratory Tract Infections, Point-of-Care Testing, & Provision of Clinical Services First, we would like to know more about the clinical services that you PERSONALLY offer to patients presenting with upper respiratory tract infection (URTI) symptoms and also to ask about the respiratory infection point-of-care "test and treat" services that you provide. "Test and treat" services are those where a pharmacist uses clinical history and point-of-care tests to inform clinical-decision making and then prescribes appropriate treatment for positive test results.* Do you currently provide assessments for patients with questions, concerns, or seeking advice regarding symptoms of an acute respiratory infection?	radio 1 Yes 2 No
25	[num_rtiadvice] Show the field ONLY if: [resp_cc] = '1'	In a TYPICAL WEEK during the current viral respiratory illness season, approximately how many patients do YOU encounter asking for advice about respiratory infection symptoms?	radio 1 0 to 5 2 6 to 10 3 11 to 15 4 16 to 20 5 More than 20
26	[site_poc] Show the field ONLY if: [screen] = '1'	Does your PRIMARY PRACTICE SITE currently offer ANY point-of-care testing services?	radio, Required 1 Yes 2 No
27	[rti_service_label] Show the field ONLY if: [screen] = '1'	At present, do you PERSONALLY provide point-of-care testing services for any of the following respiratory conditions at your PRIMARY or any SECONDARY practice sites:	descriptive

28	[tt_strep] Show the field ONLY if: [screen] = '1'	Strep throat	radio (Matrix), Required 1 Yes 2 No
29	[tt_flu] Show the field ONLY if: [screen] = '1'	Influenza	radio (Matrix), Required 1 Yes 2 No
30	[tt_covid] Show the field ONLY if: [screen] = '1'	COVID-19	radio (Matrix), Required 1 Yes 2 No
31	[tt_crp] Show the field ONLY if: [screen] = '1'	C-reactive protein (CRP) testing for respiratory tract infection	radio (Matrix), Required 1 Yes 2 No
32	[tt_rsv] Show the field ONLY if: [screen] = '1'	Respiratory Syncytial Virus (RSV)	radio (Matrix), Required 1 Yes 2 No
33	[asym_covid_label] Show the field ONLY if: [screen] = '1'	DURING THE PANDEMIC, did you PERSONALLY provide any of the following services at your PRIMARY or any SECONDARY practice sites:	descriptive
34	[asym_covid] Show the field ONLY if: [screen] = '1'	Asymptomatic point-of-care COVID-19 testing	radio (Matrix) 1 Yes 2 No
35	[pres_urti_label] Show the field ONLY if: [apa] = '1'	As a pharmacist with prescriptive authority (APA), in the PAST 3 MONTHS have you PRESCRIBED the following medications for initial access?	descriptive
36	[pres_pax] Show the field ONLY if: [apa] = '1'	Paxlovid for high-risk patients with COVID-19	radio (Matrix) 1 Yes 2 No
37	[pres_flutx] Show the field ONLY if: [apa] = '1'	Empiric antiviral treatment (e.g., oseltamivir) for treatment of clinically diagnosed or laboratory confirmed influenza	radio (Matrix) 1 Yes 2 No
38	[pres_flupx] Show the field ONLY if:	Antiviral treatment (e.g., oseltamivir) for prevention of influenza	radio (Matrix) 1 Yes

	[apa] = '1'		2 No
39	[gen_rti_label] Show the field ONLY if: [resp_cc] = '1'	In a TYPICAL WEEK how often do you provide the following services to patients with upper respiratory tract infection (URTI) symptoms?	descriptive
40	[otc_couns] Show the field ONLY if: [resp_cc] = '1'	Assisting with OTC medication counselling and product selection	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
41	[decide_md] Show the field ONLY if: [resp_cc] = '1'	Helping patients decide when they should seek care from another health care provider	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
42	[educ_abx] Show the field ONLY if: [resp_cc] = '1'	Educating patients about when antibiotic therapy is and is not appropriate for respiratory tract infections	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
43	[educ_selfcare] Show the field ONLY if: [resp_cc] = '1'	Educating about non-pharmacologic and self-care for respiratory tract infections	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
44	[refer] Show the field ONLY if: [resp_cc] = '1'	When you are not able to provide clinical services to patients with URTI symptoms, where do you refer them to? (Select all that apply)	checkbox 1 refer___1 Health Link 811 2 refer___2 Physician walk in clinic 3 refer___3 Their family physician 4 refer___4 Nurse practitioner 5 refer___5 A pharmacist colleague 6 refer___6 Emergency department

			7 refer___7 Other
45	[refer_other] Show the field ONLY if: [refer(7)] = '1'	Where else do you refer patients?	text
46	[progress_part2] Show the field ONLY if: [screen] = '1'	10% Complete.	descriptive
47	[personal_intentions1_label] Show the field ONLY if: [site_poc] = '1' and ([tt_strep] = '2' or [tt_flu] = '2' or [tt_covid] = '2' or [tt_crp] = '2' or [tt_rsv] = '2' or [pres_pax] = '2' or [pres_flutx] = '2' or [pres_flupx] = '2')	Section Header: *INTENTIONS & WILLINGNESS to Provide Services for Patients with Respiratory Tract Infection Symptoms...* Please answer the following questions...	descriptive
48	[pers_willingness_apa_label] Show the field ONLY if: [site_poc] = '1' and [apa] = '2'	You indicated that you DO NOT have Additional Prescribing Authorization	descriptive
49	[pers_willingness_apa] Show the field ONLY if: [site_poc] = '1' and [apa] = '2'	Do you INTEND to obtain Additional Prescribing Authorization within the next 3 MONTHS?	radio (Matrix) 1 Yes 2 No
50	[pers_intent1_label2] Show the field ONLY if: [site_poc] = '1' and ([tt_strep] = '2' or [tt_flu] = '2' or [tt_covid] = '2' or [tt_crp] = '2' or [tt_rsv] = '2' or [pres_pax] = '2' or [pres_flutx] = '2' or [pres_flupx] = '2')	You indicated that you PERSONALLY do NOT provide the following list of services at the present time. Do you INTEND to start providing these services prior to the 2024/2025 respiratory illness season?	descriptive
51	[pers_intend_ttstrep]	Test & Treat for strep throat	radio (Matrix)

	Show the field ONLY if: [site_poc] = '1' and [tt_strep] = '2'		1 Yes 2 No 3 Unsure
52	[pers_intend_ttflu] Show the field ONLY if: [site_poc] = '1' and [tt_flu] = '2'	Test & Treat for influenza	radio (Matrix) 1 Yes 2 No 3 Unsure
53	[pers_intend_ttcovid] Show the field ONLY if: [site_poc] = '1' and [tt_covid] = '2'	Test & Treat for COVID-19	radio (Matrix) 1 Yes 2 No 3 Unsure
54	[pers_intend_ttcrp] Show the field ONLY if: [site_poc] = '1' and [tt_crp] = '2'	CRP testing for respiratory tract infection	radio (Matrix) 1 Yes 2 No 3 Unsure
55	[pers_intend_ttrsv] Show the field ONLY if: [site_poc] = '1' and [tt_rsv] = '2'	RSV point-of-care testing	radio (Matrix) 1 Yes 2 No 3 Unsure
56	[intend_prespax] Show the field ONLY if: [site_poc] = '1' and [pres_pax] = '2'	Prescribing Paxlovid for high-risk patients with COVID-19	radio (Matrix) 1 Yes 2 No 3 Unsure
57	[intend_presflutx] Show the field ONLY if: [site_poc] = '1' and [pres_flutx] = '2'	Prescribing empiric antiviral treatment (e.g., oseltamivir) for treatment of clinically diagnosed or laboratory confirmed influenza	radio (Matrix) 1 Yes 2 No 3 Unsure
58	[intend_presflupx] Show the field ONLY if: [site_poc] = '1' and [pres_flupx] = '2'	Prescribing antiviral treatment (e.g., oseltamivir) for prevention of influenza	radio (Matrix) 1 Yes 2 No 3 Unsure
59	[pers_willingness_label] Show the field ONLY if:	If you were trained on the proper technique in the future, are you PERSONALLY WILLING to perform the following services?	descriptive

	[site_poc] = '1' and ([tt_strep] = '2' or [tt_flu] = '2' or [tt_covid] = '2' or [tt_rsv] = '2')		
60	[pers_willingness_ttstrep] Show the field ONLY if: [site_poc] = '1' and [tt_strep] = '2'	Test & Treat for strep throat	radio (Matrix) 1 Yes 2 No
61	[pers_willingness_ttflu] Show the field ONLY if: [site_poc] = '1' and [tt_flu] = '2'	Test & Treat for influenza	radio (Matrix) 1 Yes 2 No
62	[pers_willingness_ttcovid] Show the field ONLY if: [site_poc] = '1' and [tt_covid] = '2'	Test & Treat for COVID-19	radio (Matrix) 1 Yes 2 No
63	[pers_willingness_ttcrp] Show the field ONLY if: [site_poc] = '1' and [tt_crp] = '2'	CRP testing for respiratory tract infection	radio (Matrix) 1 Yes 2 No
64	[pers_willingness_ttrsv] Show the field ONLY if: [site_poc] = '1' and [tt_rsv] = '2'	Point-of-care testing for RSV	radio (Matrix) 1 Yes 2 No
65	[pers_conf_chng_label] Show the field ONLY if: [site_poc] ='1' and [asym_covid] = '1' and ([tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1')	You indicated that you DID provide asymptomatic COVID-19 testing during the pandemic and CURRENTLY provide the following point-of-care tests. Please rate the degree to which providing asymptomatic COVID-19 testing changed your WILLINGNESS to perform these point-of care tests:	descriptive
66	[pers_strep_conf] Show the field ONLY if:	Strep throat	radio (Matrix) 1 Decreased a lot 2 Decreased a little

	[site_poc] = '1' and [asym_covid] = '1' and [tt_strep] = '1'		3 No change 4 Increased a little 5 Increased a lot
67	[pers_flu_conf] Show the field ONLY if: [site_poc] = '1' and [asym_covid] = '1' and [tt_flu] = '1'	Influenza	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot
68	[pers_symp_covid_conf] Show the field ONLY if: [site_poc] = '1' and [asym_covid] = '1' and [tt_covid] = '1'	COVID-19 testing for symptomatic patients	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot
69	[pers_symp_crp_conf] Show the field ONLY if: [site_poc] = '1' and [asym_covid] = '1' and [tt_crp] = '1'	CRP testing for respiratory tract infection	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot
70	[site_intentions1_label] Show the field ONLY if: [site_poc] = '2' and ([tt_strep] = '2' or [tt_flu] = '2' or [tt_covid] = '2' or [tt_crp] = '2' or [tt_rsv] = '2' or [pres_pax] = '2' or [pres_flutx] = '2' or [pres_flupx] = '2')	Section Header: *INTENTIONS & WILLINGNESS to Provide Services for Patients with Respiratory Tract Infection Symptoms...* Please answer the following questions...	descriptive
71	[site_willingness_apa_label] Show the field ONLY if: [site_poc] = '2' and [apa] = '2'	You indicated that you DO NOT have Additional Prescribing Authorization	descriptive
72	[site_willingness_apa]	Do you INTEND to obtain Additional Prescribing Authorization within the next 3	radio (Matrix)

	Show the field ONLY if: [site_poc] = '2' and [apa] = '2'	MONTHS?	1 Yes 2 No
73	[site_intent1_label2] Show the field ONLY if: [site_poc] = '2' and ([tt_strep] = '2' or [tt_flu] = '2' or [tt_covid] = '2' or [tt_crp] = '2' or [tt_rsv] = '2' or [pres_pax] = '2' or [pres_flutx] = '2' or [pres_flupx] = '2')	You indicated that NEITHER you nor your primary practice site currently provide the following list of services. To the best of your knowledge does your PRIMARY PRACTICE SITE INTEND to start providing these services prior to the 2024/2025 respiratory illness season?	descriptive
74	[site_intend_ttstrep] Show the field ONLY if: [site_poc] = '2' and [tt_strep] = '2'	Test & Treat for strep throat	radio (Matrix) 1 Yes 2 No 3 Unsure
75	[site_intend_ttflu] Show the field ONLY if: [site_poc] = '2' and [tt_flu] = '2'	Test & Treat for influenza	radio (Matrix) 1 Yes 2 No 3 Unsure
76	[site_intend_ttcovid] Show the field ONLY if: [site_poc] = '2' and [tt_covid] = '2'	Test & Treat for COVID-19	radio (Matrix) 1 Yes 2 No 3 Unsure
77	[site_intend_ttcrp] Show the field ONLY if: [site_poc] = '2' and [tt_crp] = '2'	CRP testing for respiratory tract infection	radio (Matrix) 1 Yes 2 No 3 Unsure
78	[site_intend_ttrsv] Show the field ONLY if: [site_poc] = '2' and [tt_rsv] = '2'	Point-of-care testing for RSV	radio (Matrix) 1 Yes 2 No 3 Unsure
79	[site_intend_pres_label]	Do you PERSONALLY INTEND to start providing the following services prior to the 2024/2025 respiratory illness season?	descriptive

	Show the field ONLY if: [site_poc] = '2' and ([pres_pax] = '2' or [pres_flutx] = '2' or [pres_flupx] = '2')		
80	[intend_prespax2] Show the field ONLY if: [site_poc] = '2' and [pres_pax] = '2'	Prescribing Paxlovid for high-risk patients with COVID-19	radio (Matrix) 1 Yes 2 No
81	[intend_presflutx2] Show the field ONLY if: [site_poc] = '2' and [pres_flutx] = '2'	Prescribing empiric antiviral treatment (e.g., oseltamivir) for treatment of clinically diagnosed or laboratory confirmed influenza	radio (Matrix) 1 Yes 2 No
82	[intend_presflupx2] Show the field ONLY if: [site_poc] = '2' and [pres_flupx] = '2'	Prescribing antiviral treatment (e.g., oseltamivir) for prevention of influenza	radio (Matrix) 1 Yes 2 No
83	[site_willingness_label] Show the field ONLY if: [site_poc] = '2' and ([tt_strep] = '2' or [tt_flu] = '2' or [tt_covid] = '2' or [tt_rsv] = '2')	If you were trained on the proper technique in the future, are you PERSONALLY WILLING to perform the following services?	descriptive
84	[site_willingness_ttstrep] Show the field ONLY if: [site_poc] = '2' and [tt_strep] = '2'	Test & Treat for strep throat	radio (Matrix) 1 Yes 2 No
85	[site_willingness_ttflu] Show the field ONLY if: [site_poc] = '2' and [tt_flu] = '2'	Test & Treat for influenza	radio (Matrix) 1 Yes 2 No
86	[site_willingness_ttcovid] Show the field ONLY if:	Test & Treat for COVID-19	radio (Matrix) 1 Yes 2 No

	[site_poc] = '2' and [tt_covid] = '2'		
87	[site_willingness_ttcrp] Show the field ONLY if: [site_poc] = '2' and [tt_crp] = '2'	CRP testing for respiratory tract infection	radio (Matrix) 1 Yes 2 No
88	[site_willingness_ttrsv] Show the field ONLY if: [site_poc] = '2' and [tt_rsv] = '2'	Point-of-care testing for RSV	radio (Matrix) 1 Yes 2 No
89	[conf_chng_label] Show the field ONLY if: [site_poc] = '2' and [asym_covid] = '1' and ([tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1')	You indicated that you DID provide asymptomatic COVID-19 testing during the pandemic and CURRENTLY provide the following point-of-care tests. Please rate the degree to which providing asymptomatic COVID-19 testing changed your WILLINGNESS to perform these point-of care tests:	descriptive
90	[strep_conf] Show the field ONLY if: [site_poc] = '2' and [asym_covid] = '1' and [tt_strep] = '1'	Strep throat	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot
91	[flu_conf] Show the field ONLY if: [site_poc] = '2' and [asym_covid] = '1' and [tt_flu] = '1'	Influenza	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot
92	[symp_covid_conf] Show the field ONLY if: [site_poc] = '2' and [asym_covid] = '1' and [tt_covid] = '1'	COVID-19 testing for symptomatic patients	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot

93	[symp_crp_conf] Show the field ONLY if: [site_poc] = '2' and [a sym_covid] = '1' and [tt_crp] = '1'	CRP testing for respiratory tract infection	radio (Matrix) 1 Decreased a lot 2 Decreased a little 3 No change 4 Increased a little 5 Increased a lot
94	[cacp] Show the field ONLY if: [screen] = '1'	Section Header: *Now we would like to ask more about the CLINICAL SERVICES that you provide... In the PAST 3 MONTHS, how often have you PERSONALLY provided the following PATIENT CARE services?* Comprehensive annual care plans (CACP) or Standardized Medication Management Assessments (SMMA) [initial or follow-up]	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
95	[a_htn] Show the field ONLY if: [screen] = '1'	In pharmacy blood pressure measurement & hypertension management	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
96	[netcare] Show the field ONLY if: [screen] = '1'	Consulting Netcare to look up a patient's laboratory test results while providing patient care services	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
97	[ppoc_other] Show the field ONLY if: [screen] = '1'	Conducting POINT-OF-CARE tests for OTHER conditions such as diabetes, lipids, or other non-respiratory infectious diseases	radio (Matrix), Required 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
98	[a_lab_test] Show the field ONLY if: [pracid] = '1'	Ordering laboratory tests	radio (Matrix), Required 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily

99	[a_vacc] Show the field ONLY if: [inj_auth] = '1'	Vaccination services	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
100	[a_inj_med] Show the field ONLY if: [inj_auth] = '1'	Non-vaccine medication injection services	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
101	[a_trav_hlth] Show the field ONLY if: [screen] = '1'	Travel health consultations	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
102	[a_uti] Show the field ONLY if: [apa] = '1'	Management of uncomplicated urinary tract infections	radio (Matrix) 1 Not at all 2 About every other month 3 About once a month 4 About once a week 5 Daily
103	[netcare_amox] Show the field ONLY if: [screen] = '1'	Section Header: *In your CURRENT practice, how often do you check Netcare for RENAL FUNCTION before filling prescriptions for the following medications?* Amoxicillin	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the patient's history 3 Every new prescription 4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
104	[netcare_rivarox] Show the field ONLY if: [screen] = '1'	Rivaroxaban	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the

			patient's history 3 Every new prescription 4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
105	[netcare_empa] Show the field ONLY if: [screen] = '1'	Empagliflozin	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the patient's history 3 Every new prescription 4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
106	[netcare_panto] Show the field ONLY if: [screen] = '1'	Pantoprazole	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the patient's history 3 Every new prescription 4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
107	[netcare_osel] Show the field ONLY if: [screen] = '1'	Oseltamivir	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the patient's history 3 Every new prescription 4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
108	[netcare_pax] Show the field ONLY if: [screen] = '1'	Paxlovid	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the patient's history 3 Every new prescription

			4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
109	[netcare_azithro] Show the field ONLY if: [screen] = '1'	Azithromycin	radio (Matrix) 1 Not at all 2 Only if there is indication of chronic kidney disease in the patient's history 3 Every new prescription 4 Every new prescription and I would provide a LAB requisition if there was no Creatinine available in the past year.
110	[a1c_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Section Header: *You indicated that you provide point-of-care tests for OTHER conditions such as diabetes or non-respiratory infectious diseases. Which of the following POINT-OF-CARE tests do you currently conduct as part of your practice?* A1C	radio (Matrix) 1 Yes 2 No
111	[lipid_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Lipids	radio (Matrix) 1 Yes 2 No
112	[hiv_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	HIV/Syphilis	radio (Matrix) 1 Yes 2 No
113	[hepc_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Hepatitis C	radio (Matrix) 1 Yes 2 No
114	[creat_poc] Show the field ONLY if:	Creatinine	radio (Matrix) 1 Yes 2 No

	[ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'		
115	[inr_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	INR	radio (Matrix) 1 Yes 2 No
116	[cloz_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Neutrophils for clozapine monitoring	radio (Matrix) 1 Yes 2 No
117	[other_poc] Show the field ONLY if: [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Other (please specify)	radio (Matrix) 1 Yes 2 No
118	[poc_other] Show the field ONLY if: [other_poc] = '1'	What are the other point-of-care tests you perform?	text
119	[a1c_lab] Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'	Section Header: *You indicated that you order LABORATORY tests as part of your practice. In the PAST 3 MONTHS, which of the following LABORATORY tests have you ordered?* A1C	radio (Matrix) 1 Yes 2 No
120	[lipid_lab] Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'	Lipid panel	radio (Matrix) 1 Yes 2 No
121	[creat_lab]	Serum Creatinine	radio (Matrix) 1 Yes

	Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'		2 No
122	[lytes_lab] Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'	Electrolytes (e.g., Sodium, potassium)	radio (Matrix) 1 Yes 2 No
123	[cbc_lab] Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'	CBC (with or without differential)	radio (Matrix) 1 Yes 2 No
124	[tsh_lab] Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'	TSH	radio (Matrix) 1 Yes 2 No
125	[other_lab] Show the field ONLY if: [pracid] = '1' and [a_lab_test] = '2' or [a_lab_test] = '3' or [a_lab_test] = '4' or [a_lab_test] = '5'	Other (please specify)	radio (Matrix) 1 Yes 2 No
126	[lab_other] Show the field ONLY if: [other_lab] = '1'	What are the other lab tests you order?	text
127	[poc_platform] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] =	Section Header: *QUESTIONS ABOUT UPPER RESPIRATORY TRACT INFECTION (URTI) "TEST & TREAT" or OTHER POINT-OF-CARE TESTING SERVICES... You indicated that you provide point-of-care testing services for strep throat, or influenza, or COVID, or CRP, or perform point-of-care tests for other conditions such as diabetes or non-respiratory*	checkbox 1 poc_platform___1 Rapid antigen tests

	'1' or [tt_crp] = '1' or [tt_rsv] ='1' or [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	*infectious disease. Now we would like to ask you more about your practices in providing these services.* Which of the following point-of-care testing platforms do you currently use in your practice? (Select all that apply)	2 | poc_platform___2 | Rapid antigen test with BD Veritor Plus Analyzer 3 | poc_platform___3 | Abbott ID Now 4 | poc_platform___4 | Abbott Affinion 5 | poc_platform___5 | Bayer A1C Now 6 | poc_platform___6 | Cholestech LDX 7 | poc_platform___7 | Other 8 | poc_platform___8 | Not Sure
128	[poc_platother] Show the field ONLY if: [poc_platform(7)] = '1'	Please specify the other point-of-care testing platforms you use in your practice.	text
129	[poc_train] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1' or [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	What training did you receive to perform point-of-care testing? (Select all that apply)	checkbox 1 | poc_train___1 | No training 2 | poc_train___2 | Part of undergraduate curriculum 3 | poc_train___3 | Self-study 4 | poc_train___4 | Accredited online continuing education 5 | poc_train___5 | On the job training 6 | poc_train___6 | ACP Prescribed activity during 2020/2021 CE cycle 7 | poc_train___7 | Other
130	[poc_trainother] Show the field ONLY if: [poc_train(7)] = '1'	Please specify the other training you received for point-of-care testing.	text
131	[policy] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1' or [ppoc_	Other than the Alberta College of Pharmacy (ACP) Standards of Practice, is there a written policy (or standard operating procedure) to guide point-of-care testing services at your practice site?	radio 1 | Yes 2 | No 3 | Unsure

	other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'		
132	[algorithm_label] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	Do you use an ALGORITHM, CARE PATHWAY, or PROTOCOL to guide care for patients with presumed:	descriptive
133	[alg_strep] Show the field ONLY if: [tt_strep] = '1'	Strep throat	radio (Matrix) 1 Yes 2 No
134	[alg_flu] Show the field ONLY if: [tt_flu] = '1'	Influenza	radio (Matrix) 1 Yes 2 No
135	[alg_covid] Show the field ONLY if: [tt_covid] = '1'	COVID-19	radio (Matrix) 1 Yes 2 No
136	[alg_crp] Show the field ONLY if: [tt_crp] = '1'	CRP testing for respiratory tract infection	radio (Matrix) 1 Yes 2 No
137	[alg_rsv] Show the field ONLY if: [tt_rsv] = '1'	Respiratory Syncytial Virus (RSV)	radio (Matrix) 1 Yes 2 No
138	[di_resources] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_rsv] = '1'	What THERAPEUTIC or DRUG INFORMATION resources do you use to guide clinical decision-making for patients with URTI symptoms? (Select all that apply)	checkbox 1 di_resources___1 Bugs and Drugs 2 di_resources___2 Therapeutic Choices 3 di_resources___3 DynaMed 4 di_resources___4 UpToDate 5 di_resources___5 CPS 6 di_resources___6 Lexicomp 7 di_resources___7 Other 8 di_resources___8 None
139	[di_other]	What are the other resources you refer to?	text

	Show the field ONLY if: [di_resources(7)] = '1'		
140	[staff_assist_label] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1' or [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Support from your pharmacy team for point-of-care testing services...	descriptive
141	[tech_assist] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1' or [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Do pharmacy TECHNICIANS collect or analyze the test sample as part of the clinical encounter?	radio (Matrix) 1 Yes 2 No
142	[stud_assist] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1' or [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Do pharmacy STUDENTS collect or analyze the test sample as part of the clinical encounter?	radio (Matrix) 1 Yes 2 No
143	[alt_strep_numpts] Show the field ONLY if: [tt_strep] = '1'	Section Header: *STREP THROAT "Test and Treat" Services... This series of questions asks you to approximate the FREQUENCY and ACTIONS you take related to STREP THROAT "Test and treat" services during a TYPICAL week in the current respiratory illness season.* In a TYPICAL week, how many patients approach you for strep throat testing?	radio (Matrix) 1 0 to 5 2 6 to 10 3 11 to 15 4 16 to 20 5 More than 20
144	[alt_strep_header] Show the field ONLY if:	Of THESE encounters, for what percentage do you...	descriptive

	[tt_strep] = '1'		
145	[alt_strep_perctest] Show the field ONLY if: [tt_strep] = '1'	Actually CONDUCT a point-of-care test?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
146	[alt_strep_percpress] Show the field ONLY if: [tt_strep] = '1'	Feel PRESSURED to perform the test when you determine it is not clinically necessary?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
147	[alt_strep_percabx] Show the field ONLY if: [tt_strep] = '1'	PRESCRIBE antibiotic therapy?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
148	[alt_strep_percsx] Show the field ONLY if: [tt_strep] = '1'	PRESCRIBE prescription-based symptomatic therapies (e.g., Benzydamine oral rinse)?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
149	[alt_flu_numpts] Show the field ONLY if: [tt_flu] = '1'	Section Header: *INFLUENZA "Test and Treat" Services... This series of questions asks you to approximate the FREQUENCY and ACTIONS you take related to INFLUENZA "Test and treat" services during a TYPICAL week in the current respiratory illness season.* In a TYPICAL week, how many patients approach you for influenza testing?	radio (Matrix) 1 0 to 5 2 6 to 10 3 11 to 15 4 16 to 20 5 More than 20
150	[alt_flu_header] Show the field ONLY if: [tt_flu] = '1'	Of THESE encounters, for what percentage do you...	descriptive
151	[alt_flu_perctest]	CONDUCT a point-of-care test?	radio (Matrix) 1 Less than 25%

	Show the field ONLY if: [tt_flu] = '1'		2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
152	[alt_flu_percpressabx] Show the field ONLY if: [tt_flu] = '1'	Feel PRESSURED to prescribe antibiotic therapy when you determine it is not clinically necessary?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
153	[alt_flu_perc_tam_tx] Show the field ONLY if: [tt_flu] = '1'	PRESCRIBE antiviral (e.g., Tamiflu) therapy?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
154	[alt_covid_numpts] Show the field ONLY if: [tt_covid] = '1'	Section Header: *COVID-19 "Test and Treat" Services... This series of questions asks you to approximate the FREQUENCY and ACTIONS you take related to COVID-19 "Test and treat" services for SYMTOMATIC PATIENTS during a TYPICAL week in the current respiratory illness season.* In a TYPICAL week, how many patients approach you for in-pharmacy COVID-19 testing?	radio (Matrix) 1 0 to 5 2 6 to 10 3 11 to 15 4 16 to 20 5 More than 20
155	[alt_covid_header] Show the field ONLY if: [tt_covid] = '1'	Of THESE encounters, for what percentage do you...	descriptive
156	[alt_covid_perctest] Show the field ONLY if: [tt_covid] = '1'	Actually CONDUCT an in-store point-of-care test?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
157	[alt_covid_perc_pax] Show the field ONLY if: [tt_covid] = '1'	PRESCRIBE Paxlovid therapy?	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50%

			4 About 75% 5 Almost 100%
158	[poc_percent_label] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	Section Header: *Questions about the Upper Respiratory Tract Infection (i.e., strep throat, or influenza, or COVID) "Test & treat" Services that you provide...* In a TYPICAL week, approximately what percentage of requests for upper respiratory tract infection "Test & treat" services occur:	descriptive
159	[walkin] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	On a walk-in basis	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
160	[appoint] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	On an appointment basis	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
161	[office_hrs] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	During regular physician office hours (i.e., M-F from 9 AM - 5 PM)	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
162	[evening] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	During evening and weekends	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
163	[adult] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] =	For adults	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50%

	'1' or [tt_crp] = '1' or [tt_rsv] = '1'		4 About 75% 5 Almost 100%
164	[peds] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	For pediatrics (< 18 years of age)	radio (Matrix) 1 Less than 25% 2 About 25% 3 About 50% 4 About 75% 5 Almost 100%
165	[reason_poc] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	What reasons do PATIENTS who come to the pharmacy for "test and treat" services provide for using these services? (Select all that apply)	checkbox 1 reason_poc___1 They do not have a family physician 2 reason_poc___2 They cannot get in to see their family physician 3 reason_poc___3 They are seeking after hours care 4 reason_poc___4 It is more convenient to come to the pharmacy 5 reason_poc___5 They get the results faster 6 reason_poc___6 Other 7 reason_poc___7 I'm not sure, this hasn't come up
166	[reason_other] Show the field ONLY if: [reason_poc(6)] = '1'	What are the other reasons that patients provide?	text
167	[promo] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	How are "Test and treat" clinical services for upper respiratory tract infections promoted at your primary practice site? (Select all that apply)	checkbox 1 promo___1 Corporate posters 2 promo___2 Notifications as part of dispensed prescriptions 3 promo___3 In store announcements 4 promo___4 Radio and/or television ads 5 promo___5 Social media posts 6 promo___6 Telephone auto

			<table><tr><td></td><td></td><td>attendant</td></tr><tr><td>7</td><td>promo___7</td><td>Website</td></tr><tr><td>8</td><td>promo___8</td><td>Word of mouth</td></tr><tr><td>9</td><td>promo___9</td><td>Other</td></tr><tr><td>10</td><td>promo___10</td><td>No formal promotion</td></tr></table>
168	[promo_other] Show the field ONLY if: [promo(9)] = '1'	What are the other modes of promotion?	text
169	[md_recep] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1'	What kind of reception or feedback have you received from other health care providers (e.g., family physicians) about providing URTI "test and treat" services in your practice?	radio <table><tr><td>1</td><td>Mostly negative</td></tr><tr><td>2</td><td>Neutral</td></tr><tr><td>3</td><td>Mostly positive</td></tr><tr><td>4</td><td>Not sure, I haven't had much feedback</td></tr></table>
170	[refuse_poc] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] = '1' or [ppoc_other] = '2' or [ppoc_other] = '3' or [ppoc_other] = '4' or [ppoc_other] = '5'	Section Header: *PATIENT Barriers to Upper Respiratory Tract "Test and treat" or OTHER POINT-OF-CARE testing services...* How often do PATIENTS who initially present for respiratory illness point-of-care testing (or for whom you offer a different point-of-care test) decide NOT to follow-through with the test?	radio (Matrix) <table><tr><td>1</td><td>Never</td></tr><tr><td>2</td><td>Rarely</td></tr><tr><td>3</td><td>Occasionally</td></tr><tr><td>4</td><td>Frequently</td></tr><tr><td>5</td><td>Very frequently</td></tr></table>
171	[refuse_reason_label] Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'	How often do these patients use the following reasons to REFUSE to go through with the assessment or receive point-of-care testing in the pharmacy?	descriptive
172	[refuse_sampcoll] Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'	Fear of the sample collection process	radio (Matrix) <table><tr><td>1</td><td>Never</td></tr><tr><td>2</td><td>Rarely</td></tr><tr><td>3</td><td>Occasionally</td></tr><tr><td>4</td><td>Frequently</td></tr><tr><td>5</td><td>Very frequently</td></tr></table>
173	[refuse_cost]	Costs are too high	radio (Matrix)

	Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'		1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
174	[refuse_time] Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'	It will take too long	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
175	[refuse_accuracy] Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'	Do not trust the accuracy of the test	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
176	[refuse_notnecessary] Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'	Do not think the test is necessary	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
177	[refuse_other] Show the field ONLY if: [refuse_poc] = '2' or [refuse_poc] = '3' or [refuse_poc] = '4' or [refuse_poc] = '5'	Other	radio (Matrix) 1 Never 2 Rarely 3 Occasionally 4 Frequently 5 Very frequently
178	[refuse_other_reason] Show the field ONLY if: [refuse_other] = '2' or [refuse_other] = '3' or [refuse_other] = '4' or [refuse_other] = '5'	What other reasons do patients use to REFUSE point-of-care testing?	text

179	[know1] Show the field ONLY if: [screen] = '1'	Section Header: *PART 3. KNOWLEDGE, BELIEFS, CONFIDENCE, & NEEDS In this last section, we would like to focus in on your Knowledge, Beliefs, Confidence, and Needs in providing POINT-OF-CARE "TEST AND TREAT" (T&T) services for acute upper respiratory tract infections (URTI) including strep throat, influenza, and COVID-19 in community pharmacies. Please rate how strongly you agree or disagree with the following statements...* I know how to deliver URTI T&T services according to guidelines.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
180	[skills1] Show the field ONLY if: [screen] = '1'	I have been trained to deliver URTI T&T services according to guidelines.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
181	[skills2] Show the field ONLY if: [screen] = '1'	I have the skills to deliver URTI T&T services to patients presenting with respiratory symptoms.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
182	[prof_role2] Show the field ONLY if: [screen] = '1'	Delivering URTI T&T services is WITHIN the scope of my practice as a pharmacist.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
183	[prof_role] Show the field ONLY if: [screen] = '1'	It is my responsibility as a pharmacist to deliver URTI T&T services to patients presenting with respiratory symptoms.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
184	[self_eff] Show the field ONLY if: [screen] = '1'	I am confident that I can deliver URTI T&T services according guidelines.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree

			5 Strongly Agree
185	[emo1] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	I feel comfortable about delivering URTI T&T services.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
186	[emo1alt] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_rsv] = '1'	I feel comfortable when I am delivering URTI T&T services.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
187	[emo2] Show the field ONLY if: [screen] = '1'	I feel concerned about personal exposure to/contracting COVID-19 or influenza in delivering URTI T&T services.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
188	[perc_cont1] Show the field ONLY if: [screen] = '1'	I have control over delivering URTI T&T services in my clinical practice.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
189	[progress_part3] Show the field ONLY if: [screen] = '1'	75% Complete.	descriptive
190	[outc_exp1] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	Section Header: *BELIEFS ABOUT BENEFITS... Please rate how strongly you agree or disagree with the following statements about upper respiratory tract infections (URTI) "test and treat" (T&T) services in community pharmacies. If I deliver URTI T&T services...* My patients will appreciate this.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
191	[outc_exp2]	I will get increased professional satisfaction.	radio (Matrix)

	Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'		1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
192	[outc_exp3] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	It will reduce the need for physician and/or emergency department visits.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
193	[outc_exp4] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	It will make care more accessible and convenient for patients.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
194	[reinf1alt] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	I will get recognition from my employer.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
195	[reinf2alt] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	This will generate additional revenue for my practice site.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
196	[attitude1_exp_ad] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	Overall, I expect this to be a worthwhile task.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree

197	[outc_exp1alt] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	Section Header: *BELIEFS ABOUT BENEFITS... Please rate how strongly you agree or disagree with the following statements about upper respiratory tract infections (URTI) "test and treat" (T&T) services in community pharmacies. When I deliver URTI T&T services...* My patients appreciate this.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
198	[outc_exp2alt] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	I get increased professional satisfaction.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
199	[outc_exp3alt] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	It reduces the need for physician and/or emergency department visits.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
200	[outc_exp4alt] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	It makes care more accessible and convenient for patients.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
201	[reinf1] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	I get recognition from my workplace.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
202	[reinf2] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	This generates additional revenue for my practice site.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree

203	[attitude1_acutal_ad] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	Overall, I find this to be a worthwhile task.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
204	[char_inn1] Show the field ONLY if: [screen] = '1'	Section Header: *BARRIERS & FACILITATORS - The Innovation, Practice Environment, Available Resources, & Social Influences Please rate how strongly you agree or disagree with the following statements about upper respiratory tract infection (URTI) "test and treat" (T&T) services in community pharmacies.* An URTI T&T service is compatible with daily pharmacist practice.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
205	[char_inn2] Show the field ONLY if: [screen] = '1'	As compared to other pharmacist clinical services (e.g., immunization) an URTI T&T service is simple to deliver.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
206	[advant_fast] Show the field ONLY if: [screen] = '1'	An URTI T&T service based on point-of-care testing provides faster results compared to standard laboratory testing.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
207	[advant_presc] Show the field ONLY if: [screen] = '1'	The point-of-care testing component of an URTI T&T service helps pharmacists' clinical decision-making about treatment.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
208	[char_inn3] Show the field ONLY if: [screen] = '1'	The point-of-care testing component of an URTI T&T service promotes antimicrobial stewardship.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree

209	[pol_clim1] Show the field ONLY if: [screen] = '1'	The Alberta Government provides sufficient financial support to provide URTI T&T services.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
210	[pol_clim3] Show the field ONLY if: [screen] = '1'	The current compensation model for URTI T&T services (i.e., where reimbursement is provided from the Alberta Government only when a prescribing event occurs) is appropriate.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
211	[org_char2] Show the field ONLY if: [screen] = '1'	There is enough time to deliver URTI T&T services in the pharmacy where I work.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
212	[org_char1] Show the field ONLY if: [screen] = '1'	There are sufficient potential patients who would use URTI T&T services in the pharmacy where I work.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
213	[org_char3] Show the field ONLY if: [screen] = '1'	All of the necessary resources to provide URTI T&T services are available in the pharmacy where I work.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
214	[org_char4] Show the field ONLY if: [screen] = '1'	There is sufficient space to offer URTI T&T services in my pharmacy	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree

215	[org_char5] Show the field ONLY if: [screen]= '1'	The management of the pharmacy where I work supports delivering URTI T&T services.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
216	[partic_char] Show the field ONLY if: [screen] = '1'	The public is positive about receiving URTI T&T services from a community pharmacist.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
217	[subj_norm2] Show the field ONLY if: [screen] = '1'	Other health care providers think I should deliver URTI T&T services in my practice.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
218	[conf1] Show the field ONLY if: [screen] = '1'	Section Header: *Please indicate to what extent you feel CONFIDENT about providing "Test and treat" (T&T) services for patients with upper respiratory tract infections (URTI) in the following areas:* Gathering the patient history	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
219	[conf2] Show the field ONLY if: [screen] = '1'	Performing a focused physical assessment	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
220	[conf7] Show the field ONLY if: [screen] = '1'	Deciding when to refer patients to a physician or another health care provider	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident

221	[conf3] Show the field ONLY if: [screen] = '1'	Deciding when to perform a point-of-care test	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
222	[conf4] Show the field ONLY if: [screen] = '1'	Performing a throat swab	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
223	[conf5] Show the field ONLY if: [screen] = '1'	Performing a nasal swab	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
224	[conf6] Show the field ONLY if: [screen] = '1'	Performing capillary blood sample via finger prick	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
225	[conf8] Show the field ONLY if: [screen] = '1'	Analyzing a sample using a rapid antigen detection test	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
226	[conf9] Show the field ONLY if: [screen] = '1'	Analyzing a sample using a rapid molecular test (e.g., Abbott ID Now)	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident

227	[conf12] Show the field ONLY if: [screen] = '1'	Discussing test results with patients (including their value and limitations)	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
228	[conf13] Show the field ONLY if: [screen] = '1'	Prescribing appropriate treatment	radio (Matrix) 1 Not confident at all 2 Only slightly confident 3 Somewhat confident 4 Moderately confident 5 Very confident
229	[strat1_start] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	Section Header: *Do you believe that the following STRATEGIES would be helpful for you to START offering upper respiratory tract infection "test and treat" (URTI T&T) services in your practice?* A training session on the therapeutics of relevant respiratory tract infections and how to conduct & interpret point-of-care tests	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
230	[strat2_start] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	An evidence-based algorithm, care pathway, or decision aid to help identify who should be tested and appropriate treatment options	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
231	[strat4_start] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	Developing a more collegial atmosphere towards shared care between pharmacists and physicians	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
232	[strat5_start] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	Working with an external practice facilitator who could help support service implementation	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential

233	[strat6_start] Show the field ONLY if: [tt_strep] = '2' and [tt_flu] = '2' and [tt_covid] = '2' and [tt_crp] = '2' and [tt_rsv] = '2'	The ability to upload point-of-care test results into NETCARE	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
234	[strat1] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	Section Header: *Do you believe that the following STRATEGIES would be helpful to SUSTAIN your ability to offer respiratory tract infection "test and treat" (URTI T&T) services in your practice?* A training session on the therapeutics of relevant respiratory tract infections and how to conduct & interpret point-of-care tests	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
235	[strat2] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	An evidence-based algorithm, care pathway, or decision aid to help identify who should be tested and appropriate treatment options	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
236	[strat4] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	Developing a more collegial atmosphere towards shared care between pharmacists and physicians	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
237	[strat5] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	Working with an external practice facilitator who could help support service implementation	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential
238	[strat6] Show the field ONLY if: [tt_strep] = '1' or [tt_flu] = '1' or [tt_covid] = '1' or [tt_crp] = '1' or [tt_rsv] ='1'	The ability to upload point-of-care test results into NETCARE	radio (Matrix) 1 Not at all helpful 2 Slightly helpful 3 Somewhat helpful 4 Very helpful 5 Essential

239	[cap_lab] Show the field ONLY if: ([pracid] = '2') or ([pracid] = '1' and [a_lab_test] = '1')	Section Header: *Last, you indicated that you do NOT order LABORATORY tests as part of your practice. We would like to ask a couple of questions about your beliefs about ordering LABORATORY tests. Please rate how strongly you agree or disagree with the following statements.* I have the KNOWLEDGE required to order laboratory tests for patients that require them.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
240	[opp_lab] Show the field ONLY if: ([pracid] = '2') or ([pracid] = '1' and [a_lab_test] = '1')	There is an OPPORTUNITY for me to order laboratory tests in my practice.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
241	[mot_lab] Show the field ONLY if: ([pracid] = '2') or ([pracid] = '1' and [a_lab_test] = '1')	I am MOTIVATED to order laboratory tests in my practice.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
242	[lab_intend] Show the field ONLY if: ([pracid] = '2') or ([pracid] = '1' and [a_lab_test] = '1')	I INTEND to start ordering laboratory tests in the next 3 months.	radio (Matrix) 1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
243	[views] Show the field ONLY if: [screen] = '1'	Section Header: *The End...* The research team is interested in hearing any other OPINIONS or INSIGHTS about offering clinical services for acute upper respiratory tract infections, point-of-care testing and ordering laboratory tests in community pharmacies. Please share your views.	notes
244	[fut_res] Show the field ONLY if: [screen] = '1'	We are planning a study of a CARE PATHWAY to support pharmacist management of symptomatic patients during respiratory illness season focusing on COVID-19, influenza, and RSV. Would you be willing to participate in a study on this topic?	radio 1 Yes 2 No 3 Unsure

245	[gift_card] Show the field ONLY if: [screen] = '1'	Would you like to participate in the prize draw for a chance to win one $100 pre-paid Visa gift card?If not, please ensure you click on the grey SUBMIT button at the very bottom right side of this page to submit your complete survey response.	radio 1 Yes 2 No
246	[gift_card2] Show the field ONLY if: [gift_card] = '1'	Please fill in the following Google form. Be patient. It may take up to 15 seconds to load. This information is not associated with your responses to the survey.After filling in the Google form, please ensure you click on the grey SUBMIT button at the bottom right of this page to submit your complete survey responses.	descriptive (Media URL: https://forms.gle/rdx63Vg8J245DeuL6, Display format: Inline)
247	[prize_label] Show the field ONLY if: [screen] = '1'	Thank you for taking the time to complete this survey. Please click on the grey SUBMIT button at the bottom of this page to submit your complete survey response.	descriptive
248	[progress_end]	100% Complete.	descriptive
249	[a_survey_of_community_pharmacist_care_for_acute_up_complete]	Section Header: *Form Status* Complete?	dropdown 0 Incomplete 1 Unverified 2 Complete

Appendix E: Alberta Community Pharmacist Surveys

PubMed ((pharmacist or pharmacy) AND (Survey)) AND (Alberta) n=449 results

Primary Author	Year	Topic	Objectives
Khan	2023	Injections	To describe the actions related to administering an injection, including identification of commonly administered medications, and to identify perceived barriers and facilitators pharmacists face when providing injection services.
Navarrete	2023	SRH	To explore SRH services provided by pharmacists practicing in community pharmacies in Japan, Thailand, and Canada. The secondary objectives are to identify perceived factors influencing the delivery of services and training preferences to support role expansion in each country.
Soubolsky	2023	SK – Mental Health	To describe the current practices, attitudes, and beliefs of pharmacists in providing care to individuals with mental illness, and to assess factors that may impact these practices.
Guirguis	2011	Prescribing	1)To characterize pharmacists' current prescribing behaviors in Alberta. 2)To explore reasons for not prescribing and the perceived benefits of prescribing and (3) to compare types and frequencies of prescribing in Alberta across various practice settings. 4)To explore the nature and intensity of pharmacist–physician relationships.
Schindel	2019	Continuing professional development	To identify pharmacists' professional learning needs in order to support expanded roles in practice.
Chandok	2022	Anticonvulsants	To characterize Canadian pharmacists' knowledge and comfort in managing epilepsy and antiepileptic drugs and identify areas of need for the development of support tools.
Nowlan	2019	Naloxone	To describe Alberta community pharmacists' practices, training, comfort levels and views in dispensing naloxone kits through the Community Based Naloxone program and detail potential perceived barriers to program participation.
Tam	2014	Chinese Medicine	To evaluate the perceived attitudes toward the use of Complementary Alternative Medicine (CAM) and Traditional Chinese Medicine (TCM) by pharmacists in Alberta.
Hayashi	2022	Pharmacogenomics (PGx)	To develop and evaluate a PGx course for pharmacists.

Primary Author	Year	Topic	Objectives
Ogbogu	2016	Natural Health Products	To assess the attitudes and practices of Alberta pharmacists regarding NHPs offered for sale in community pharmacies
RxA		Wage Survey	
Alhallak	2023	Aesthetic	1)To explore the demographics, experience, practice settings, types of aesthetic services offered, and perceptions of support from the Alberta College of Pharmacy (ACP) among Alberta pharmacists. 2) To understand the relationship between pharmacists' years of practice and the complexity of the aesthetic services they provide and to assess the impact of contacting the ACP on their perceptions of clarity in the aesthetic injection regulatory framework.
Bharadia	2018	Compensation Plan	To determine whether the use of a compensation plan to remunerate pharmacists for clinical pharmacy services was associated with the number of diabetes management activities provided.
Schindel	2017	Pharmacist perceptions of their roles	To understand the perceptions of pharmacists, pharmacy students, technicians, and other healthcare professionals, and the public of the pharmacist's role in Alberta.
Cressman	2017	Naloxone	To characterize the availability of naloxone in Canadian pharmacies using a telephone-based cross-sectional survey of community pharmacies.
Bascrom	2014	Travel Health	To examine both pharmacists' knowledge in travel health and their confidence in providing this advice to patients within the Alberta context. A secondary aim, anticipating the identification of knowledge and confidence deficiencies, was to identify pharmacists' preferred means for obtaining education on travel health.
Siyam	2013	Bioidentical HRT	To assess pharmacists' beliefs about bioidentical hormone therapy (BHT) and to identify factors influencing these beliefs.
Charrois	2007	NHP Drug Interactions	To identify community pharmacists' familiarity with NHPs and NHP related adverse events (AEs) and their knowledge and ability to counsel on potential and known NHP-drug interactions.
Guirguis	2000	Diabetes	To assess pharmacists' attitudes toward diabetes, to evaluate the measurement properties of the Diabetes Attitude Scale (DAS) in a sample of pharmacists, and to estimate the number and attitudes of pharmacists certified as diabetes educators.

Primary Author	**Year**	**Topic**	**Objectives**
Allen	2021	Hospital-Geriatrics	To assess the knowledge and attitudes of hospital pharmacists toward older adults.
Sadowski	2016	Hospital - Osteoporosis	To describe the practices and beliefs of pharmacists regarding use of bisphosphonates for patients with osteoporosis and chronic kidney disease.

Appendix F: Previous Survey Studies Examining Community Pharmacist POC Testing for URTI or General POC Testing

Primary Author	**Year**	**POC Test Type**	**Objectives**
Brust-Sisti 2022	2020	COVID-19	Evaluate pharmacist perceptions of COVID-19 testing in community pharmacies.
Uebbing 2021	2020	COVID-19	Investigate the views of pharmacists about COVID-19 testing.
Paul 2021	2020	COVID-19	Determine individual commitment to provide COVID-19 service, identify resources to provide services, Prioritize unmet community needs.
Nguyen 2021	2020	COVID-19	Investigate pharmacist willingness and needs to provide COVID-19 services.
Lynch 2021	NR	COVID-19	Attitudes towards POC testing and strategies to provide POC testing and barriers to COVID-19 testing.
Badr 2021	2017	Strep	Public and Community Pharmacist Perception of GAS POC testing in Saudi Arabia.
Smith 2020	2019	GAS	To evaluate the NACDS POC testing training program on the implementation of pharmacy POC testing services. in Arkansas and barriers that may have prevented or slowed implementation.
Gallimore 2020	NR	General	To describe the current landscape of POC testing in Wisconsin community pharmacies and identify opportunities for the advancement of testing and the key factors influencing the realization of these opportunities.
Dulaney 2018	2016	Influenza Strep	Assess pharmacist perceptions of POC testing and treatment for influenza and Strep in the community pharmacy setting. Observe the correlation between demographic data and responses.
Hoevelman 2017	2016	Influenza, GAS, Hep C, HIV	Describe community pharmacists' perceptions of RDT in community pharmacies in Mississippi. Correlation of Diffusion of Innovation attributes and willingness to offer RDTs.
Berthelemy 2015	NR	Sore throat	Describe sore throat management in community pharmacy.
Daunais 2015	2012	Strep	Evaluate perceived knowledge about POC testing and physical assessment & ability to interpret results.
Huang 2015	2012	Infectious diseases	Determine the extent to which pharmacy schools include POC testing content in their curriculum.
Azzopardi 2015	2015	Strep	To determine test sensitivity and specificity, patient acceptability and pharmacists' perceptions.
Aldrich 2014	2014	Blood glucose A1C	Pharmacist attitudes towards potential expansion of care services.
Demore 2018	2018	Strep	Describe RAT for adults with a sore throat.

Primary Author	**Year**	**POC Test Type**	**Objectives**
McKeirnan 2019	2019	GAS, Influenza, HIV	Implement training for student pharmacists and assess comfort with performing and recommending POC testing.

Appendix G: Other POC Testing Service Pharmacist Surveys

Primary Author	Year	POC test Type	Objectives
Dong 2017	2017	HIV	Describe Hep C POC testing screening program
Min 2020	2020	HIV HCV	Determine perception awareness and level of comfort of pharmacists and students with HIV and HC POCT in community pharmacies. Identify barriers to implementing HIC HCV POCT.
So 2019	2019	HIV	Identify pharmacist perceived barriers and level of confidence in performing community pharmacy-based POCT for HIV and HCV.
McKiernan 2021	2021	HIV	Investigate pharmacist opinions on strategies for addressing barriers to offering HIV screening.
Boulliat 2021	Abstract	General POC testing	To evaluate the use of RDT and self-tests.
Soares 2020	2020	General POC testing	Assess the availability, implementation rate, and remuneration of pharmacist-led cognitive services. POC testing in general is one of these services.
Tolle 2017 #157	2017	General POC testing	To measure pharmacist's preparedness for implementation of provider status.
Doucette 2017 #167	2017	General POC testing	Describe services provided by community pharmacies and identify factors associated with services being provided.
Santella 2016	2016	HIV	To explore community pharmacists' knowledge of HIV, their attitudes toward people living with HIV, and their willingness to offer HIV testing.
Haag 2010	2010	General POC testing	Compare the availability of pharmacist clinical services between rural and urban community pharmacies.
National Pharmacist Workforce Survey 2019 and 2022	2019	POC testing (COVID and non-COVID)	1) Describe current work activities and assess the prevalence and degree of change in work activities since March 2020 2)Describe barriers or facilitators to changing pharmacists activities 3)Prevalence of pharmacists changing their employment status 4)To assess pharmacist work-life issues 5)Assess pharmacy technician shortage

Primary Author	Year	POC test Type	Objectives
			6)Explore pharmacists' assessment of EDI efforts
McKenney 2004	2004	Lipids	To determine the beliefs and attitudes of pharmacist about the significance of CHD, statins, and their role.
Muflih 2021	2021	COVID-19	Pharmacists perceived role competence to perform frontline roles during the COVID-19 pandemic
Saha 2021	2021	Antimicrobial Stewardship	Community pharmacist awareness and uptake of evidence-based antimicrobial stewardship strategies, attitudes towards collaboration with GPs, and needs to improve AMS practices.
Nguyen 2020	2020	General POC testing	To characterize direct patient care service provided by Idaho community pharmacists 2) to assess individual pharmacist and their work site capacity and barriers in providing expanded services.
Anderson 2018	Abstract	General POC testing	To discover reimbursement strategies used by pharmacists conducting POC testing.
Zaghab 2018	2018	Continuing Professional Development needs	To examine personal preference, practice setting, and policy initiates around the continuing education needs of pharmacists and technicians.
Hughes 2017	2017	HIV	Explore pharmacists' perceptions and attitudes towards providing HIV POCT and determine barriers to implementing HIVPOCT in practice. Understand pharmacists' current involvement in public health activities.
Schommer 2013	2013	General POC testing	Describe the types of service provided at primary community pharmacy residency program sites and levels of intensity devoted to different levels of patient care.
Moczygemba 2012	2012	Survey about pharmacy practice (not POC testing)	Assess perceptions of chronic and acute care pharmacy practice and confidence in providing patients care and medication therapy managment activities in Virginia.
Mills 2011	Abstract	HIV	Assess pharmacist and student knowledge and attitudes in relation to providing HIV TMT and POC testing.
Casserlie 2016	2016	General POC testing	Assess pharmacist opinions regarding the feasibility and appropriateness of seven

Primary Author	Year	POC test Type	Objectives
			areas of public health priority through medication therapy management services.

Appendix H: STROBE Statement—Checklist for Cross-Sectional Studies

	Item No	Recommendation	Page Number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	133
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	134
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	136
Objectives	3	State specific objectives, including any prespecified hypotheses	139
Methods			
Study design	4	Present key elements of study design early in the paper	140
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	140
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	140
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	142-144
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	144
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	142-144
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	142-144
		(*b*) Describe any methods used to examine subgroups and interactions	142-144
		(*c*) Explain how missing data were addressed	145
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	

		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	145
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	145
		(b) Indicate number of participants with missing data for each variable of interest	167
Outcome data	15*	Report numbers of outcome events or summary measures	146
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	151
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	155
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	161
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	162
Generalisability	21	Discuss the generalisability (external validity) of the study results	161
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	