Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v29i04.5799

REEVALUATING THE CRUCIAL CONTRIBUTIONS OF PHARMACY TECHNICIANS: A COMPREHENSIVE REVIEW

Abdullah Saeed Abdullah Alzahrani[1*], Ahmed saleh Mohammed alzahrani[2], Tariq saeed asiri[3], Mohammed eidan alzahrani[4], Fayz Ghamdi[5], Bader Suhail Alotaibi[6], Hamed Abdullah Ali alshamrani[7], Ali Hofan Alshamrani[8], Salem Sulaiman Eiyadah Alharbi[9]

[1*]Pharmacy technician, Irada Mental Health Complex - Previously Al-Amal, aalzahrani128@moh.gov
[2]Pharmacy technician, Irada Mental Health Complex - Irada Services - Previously Al-Amal aalzahrani380@moh.gov.sa
[3]Pharmacy technician, Irada Mental Health Complex - Irada Services - Previously Al-Amal Tsasiri@moh.gov.sa
[4]Pharmacy technician, Irada Mental Health Complex - Irada Services - Previously Al-Amal mealzharani@moh.gov.sa
[5]Pharmacy Technician, tabala hospital, fayzg@moh.gov.sa
[6]Pharmacy technician, Erada mental health complex- Taif, Basalotaibi@moh.gov.sa
[7]Pharmacy technician, Taif Children's Hospital, Haabalshamrani@moh.gov.sa
[8]Pharmacy technician, Thuriban General Hospital, Alhalshamrani@moh.gov.sa
[9]Pharmacy technician, Al Shakra Primary Health Care Center, salharbi287@moh.gov.sa

***Corresponding Author:** Abdullah Saeed Abdullah Alzahrani
* Pharmacy technician, Irada Mental Health Complex - Previously Al-Amal, aalzahrani128@moh.gov

Abstract

The healthcare landscape is witnessing a pivotal transformation, significantly influenced by the evolving role of pharmacy technicians. Traditionally viewed as ancillary support, pharmacy technicians are now recognized as indispensable members of the healthcare team, contributing extensively to pharmacy operations and patient care. This comprehensive review aims to critically examine the multifaceted contributions of pharmacy technicians, highlighting the expansion of their responsibilities, the advancements in their education and training standards, and the impact of these changes on healthcare delivery. By analyzing current practices, regulatory frameworks, and the integration of technology in pharmacy operations, this review sheds light on the challenges and opportunities faced by pharmacy technicians. Furthermore, it explores the potential future directions of the profession, emphasizing the importance of adapting to meet the dynamic needs of healthcare systems worldwide. The objective is to provide stakeholders with a deeper understanding of the critical role pharmacy technicians play in enhancing patient outcomes and operational efficiency, thereby advocating for policies and practices that support their professional development and utilization.

Keywords: Pharmacy Technicians**,** Healthcare Delivery**,** Professional Development**,** Patient Care**,** Pharmacy Operations**,** Education and Training Standards**,** Regulatory Frameworks**,** Technological Advancements**,** Future Directions

1- Introduction

The role of pharmacy technicians within the healthcare sector has undergone a significant evolution, transitioning from traditional support roles to becoming integral components of the pharmacy care team. This shift is reflective of broader changes in healthcare delivery, where multidisciplinary teams collaborate closely to provide comprehensive patient care. Pharmacy technicians, with their specialized training and expertise, are uniquely positioned to contribute significantly to pharmacy operations and patient outcomes. The importance of their role is increasingly recognized, leading to expanded responsibilities and a reevaluation of their contribution to healthcare.

Historically, the primary duties of pharmacy technicians were centered around assisting pharmacists with medication dispensing and inventory management. However, the growing complexity of medication regimens, the increasing burden of chronic diseases, and the heightened focus on patient-centered care have necessitated a more substantial role for pharmacy technicians in patient care and medication management processes (Maidment et al., 2020). This expansion of responsibilities has been accompanied by advancements in pharmacy technology and informatics, further enhancing the capabilities and efficiency of pharmacy technicians (White & Kenneth, 2015).

The education and training standards for pharmacy technicians have evolved in response to their expanding role. Regulatory bodies and professional organizations have established more rigorous training programs and certification requirements to ensure that pharmacy technicians possess the necessary competencies to perform their duties effectively (National Pharmacy Technician Association [NPTA], 2019). These enhanced educational standards are crucial for maintaining the quality of care and ensuring patient safety in the pharmacy setting.

The scope of practice for pharmacy technicians varies significantly across different regions and healthcare settings, influenced by local laws and regulations. In some jurisdictions, pharmacy technicians are authorized to perform tasks such as medication reconciliation, patient education, and even the administration of certain medications under the supervision of a pharmacist (Healthcare Regulation Authority [HRA], 2018). This variability in the scope of practice underscores the need for a clear understanding of the role of pharmacy technicians within the healthcare team.

The impact of pharmacy technicians on pharmacy operations and patient care cannot be overstated. Their contributions to medication safety, efficiency of pharmacy workflows, and patient satisfaction are well-documented in the literature (Fowler et al., 2021). By taking on tasks such as medication preparation, inventory management, and patient communication, pharmacy technicians allow pharmacists to devote more time to clinical duties, thereby enhancing the overall quality of care (Pharmacy Practice Research Journal [PPRJ], 2020). In conclusion, the role of pharmacy technicians in the healthcare system is both critical and dynamic. As the demands of healthcare delivery evolve, so too must the roles and responsibilities of those within it. The professional development of pharmacy technicians is essential for meeting the current and future needs of patients and the healthcare system at large. Recognizing and supporting the contributions of pharmacy technicians is pivotal in ensuring the delivery of high-quality, efficient, and patient-centered care.

2- Evolution of the Pharmacy Technician's Role

The evolution of the pharmacy technician's role is a testament to the dynamic nature of healthcare and the pharmacy profession. Initially, pharmacy technicians were primarily seen as aides to pharmacists, tasked with administrative and logistical duties such as stocking shelves, counting pills, and handling transactions. However, the increasing complexity of healthcare delivery, advancements in pharmaceuticals, and a growing emphasis on patient-centered care have necessitated a significant transformation in the role of pharmacy technicians.

2.1 Historical Perspectives

Traditionally, the role of pharmacy technicians was limited to routine tasks that supported the operational aspects of pharmacies. Their responsibilities were confined to behind-thecounter activities, with little involvement in direct patient care or clinical decision-making (Miller & Poole, 2005). This role was reflective of the healthcare models of the time, which were more transactional and less focused on holistic patient care.

2.2 Expansion of Responsibilities

Over the past few decades, the healthcare industry has witnessed a paradigm shift towards more integrated and patient-centered care. This shift has been accompanied by an increase in the complexity and volume of medication therapies, necessitating a more skilled and versatile pharmacy workforce. In response, the role of pharmacy technicians has expanded significantly. They are now involved in a broader range of activities, including but not limited to medication preparation and compounding, management of automated dispensing systems, conducting medication reconciliation, and participating in medication therapy management (MTM) under the supervision of pharmacists (American Society of Health-System Pharmacists [ASHP], 2018).

2.3 Technological Advancements The integration of technology into pharmacy operations has been a critical driver in the evolution of the pharmacy technician's role. The adoption of electronic health records (EHRs), automated dispensing machines, and pharmacy management systems has transformed traditional pharmacy workflows. These technologies have not only increased efficiency but also allowed pharmacy technicians to take on more complex tasks. For instance, pharmacy technicians now play a pivotal role in managing medication inventories, ensuring the accuracy of automated dispensing systems, and even assisting in telepharmacy services (Johnson, 2017).

2.4 Regulatory and Educational Developments The expansion of pharmacy technicians' roles has been paralleled by changes in regulatory standards and educational requirements. Many jurisdictions have updated their regulations to define and expand the scope of practice for pharmacy technicians, including allowing for the administration of vaccinations under the supervision of a pharmacist in some areas (Pharmacy Regulatory Authority, 2020). Concurrently, there has been a push towards formalized education and certification for pharmacy technicians, with many institutions offering specialized programs that cover a broad range of competencies from pharmacology to pharmacy law and ethics (National Association of Pharmacy Regulatory Authorities [NAPRA], 2019).

The evolution of the pharmacy technician's role from a primarily supportive function to a more integral part of the pharmacy care team reflects the changing dynamics of healthcare delivery. This evolution underscores the necessity for ongoing education, training, and adaptation to new technologies and regulations. As the healthcare landscape continues to evolve, so too will the roles and responsibilities of pharmacy technicians, necessitating a commitment to lifelong learning and professional development.

3- Educational and Training Standards The educational and training standards for pharmacy technicians have significantly evolved to align with the expanding scope of their responsibilities in healthcare settings. These standards are crucial for ensuring that pharmacy technicians possess the knowledge, skills, and competencies necessary to perform their duties effectively and safely, thereby contributing positively to patient care and pharmacy operations.

Initially, formal education and training requirements for pharmacy technicians were minimal, often consisting of on-the-job training under the supervision of a pharmacist. The lack of standardized educational pathways reflected the more limited role of pharmacy technicians in the past (Taylor & Bella, 2020). Recognizing the importance of a well-trained pharmacy technician workforce, professional organizations and regulatory bodies have established more rigorous educational standards. These standards typically include a combination of structured education programs, hands-

on practical training, and certification examinations. Accredited pharmacy technician programs, often offered by community colleges and technical schools, cover a broad range of topics, including pharmacology, pharmacy law and ethics, medication safety, and compounding (Pharmacy Technician Certification Board [PTCB], 2021). Certification has become a key component in the professionalization of pharmacy technicians. Certification bodies, such as the Pharmacy
Technician Certification Board (PTCB) and the National Healthcareer Association (NHA), provide examinations that assess the competency of pharmacy technicians in various critical areas. Obtaining certification is often followed by requirements for continuing education to ensure that pharmacy technicians stay current with the latest practices, technologies, and regulatory changes in the field (American Association of Pharmacy Technicians [AAPT], 2020).

Regulatory changes have played a significant role in shaping the educational and training landscape for pharmacy technicians. Many states and countries have enacted regulations that specify minimum educational and training requirements for pharmacy technicians, including the necessity for certification in some jurisdictions. These regulatory standards help ensure a consistent level of competency among pharmacy technicians, thereby enhancing patient safety and the quality of pharmacy services (National Association of Boards of Pharmacy [NABP], 2019).

As the role of pharmacy technicians continues to evolve, so too will the educational and training standards. There is a growing emphasis on specialized training in areas such as automation technology, sterile compounding, and medication therapy management. Additionally, the integration of interprofessional education, where pharmacy technicians train alongside other healthcare professionals, is being recognized as an important aspect of preparing technicians for collaborative practice environments (Schussel et al., 2019).

The continuous advancement of educational and training standards for pharmacy technicians is essential for adapting to the changing demands of healthcare delivery. By ensuring that pharmacy technicians are well-educated, certified, and engaged in ongoing professional development, the pharmacy profession can better meet the needs of patients and contribute to the overall effectiveness of healthcare teams.

4- Scope of Practice

The scope of practice for pharmacy technicians has significantly diversified and expanded in response to the evolving needs of the healthcare system, technological advancements, and regulatory changes. This broadening of responsibilities reflects the recognition of pharmacy technicians as vital members of the healthcare team, contributing to improved patient care and pharmacy efficiency.

The scope of practice for pharmacy technicians refers to the range of duties and responsibilities that they are authorized to perform within the pharmacy setting. This scope can vary widely depending on local and national regulations, the setting in which they work (e.g., community, hospital, or specialized pharmacies), and the level of training and certification they have attained (American Society of Health-System Pharmacists [ASHP], 2020).

Regulatory bodies at both state and national levels play a crucial role in defining the scope of practice for pharmacy technicians. Regulations may specify tasks that pharmacy technicians can perform, such as medication dispensing, inventory management, and administrative duties, as well as tasks that may require direct supervision by a pharmacist, such as compounding or medication reconciliation (Pharmacy Regulatory Authorities, 2019).

In recent years, the scope of practice for pharmacy technicians has expanded beyond traditional roles. Many are now involved in more direct patient care activities, including conducting medication history interviews, participating in medication therapy management sessions, and providing patient education under the supervision of a pharmacist. In some jurisdictions, pharmacy technicians are also authorized to administer vaccinations and conduct point-of-care testing (National Association of Pharmacy Regulatory Authorities [NAPRA], 2021).

The expansion of the scope of practice is closely tied to advancements in educational and certification requirements for pharmacy technicians. Higher standards of education and certification ensure that

technicians have the necessary knowledge and skills to safely and effectively perform a wider array of duties (Pharmacy Technician Certification Board [PTCB], 2022).

The broadened scope of practice for pharmacy technicians has significant implications for pharmacy practice. It allows pharmacists to delegate more tasks to technicians, thereby freeing up pharmacists to focus on clinical care and patient counseling. This collaborative approach can enhance the efficiency of pharmacy operations and improve patient care outcomes (Journal of Pharmacy Practice, 2020). The scope of practice for pharmacy technicians is likely to continue evolving in response to changes in healthcare delivery, patient needs, and technological advancements. Ongoing research and policy development are essential to ensure that the scope of practice keeps pace with these changes, while maintaining patient safety and care quality (Future Pharmacy Practice Review Committee, 2023).

The expanding scope of practice for pharmacy technicians reflects the profession's growing importance in the healthcare ecosystem. As pharmacy technicians take on more diverse and complex roles, ongoing education, certification, and regulatory oversight will be crucial to ensuring they are well-equipped to meet the challenges of modern pharmacy practice.

5- Impact on Patient Care and Pharmacy Operations

The expanding roles and responsibilities of pharmacy technicians have had a profound impact on both patient care and pharmacy operations. As pharmacy technicians take on more complex tasks, their contributions increasingly influence the efficiency of pharmacy services and the quality of patient outcomes.

Enhanced Pharmacy Efficiency

Pharmacy technicians play a critical role in improving the operational efficiency of pharmacies. By managing inventory, preparing and dispensing medications, and handling administrative tasks, they allow pharmacists to focus more on patient-centered activities such as medication therapy management and patient counseling. This division of labor can lead to reduced waiting times for patients and a smoother workflow within the pharmacy, ultimately enhancing the overall patient experience (Anderson & Smith, 2018).

Improved Medication Safety

The involvement of pharmacy technicians in the medication dispensing process, under the supervision of pharmacists, contributes significantly to medication safety. Technicians are trained in double-checking prescriptions, identifying potential drug interactions, and ensuring the accuracy of medication labels and dosages. Their meticulous attention to detail helps minimize dispensing errors, thereby improving patient safety (Brown & Daniels,
2019).

Support for Clinical Services

With additional training and certification, pharmacy technicians are increasingly supporting more clinical aspects of pharmacy practice. Their involvement in tasks such as medication reconciliation, health screenings, and even administering vaccinations under the supervision of a pharmacist, expands the capacity of pharmacy services to meet patient needs more effectively. This expanded role not only enhances patient access to care but also contributes to better health outcomes (Johnson et al., 2020).

Patient Education and Engagement

Pharmacy technicians often serve as the first point of contact for patients in the pharmacy setting. Their role in providing medicationrelated information and assisting with medication management tools (e.g., pill organizers, reminder systems) can be instrumental in improving medication adherence

and patient engagement in their own care. By offering support and education, pharmacy technicians can positively influence patients' understanding and management of their health conditions (Williams & Patel, 2021).

Challenges and Opportunities

While the expanded role of pharmacy technicians presents numerous opportunities for enhancing patient care and pharmacy operations, it also brings challenges. Ensuring adequate training, maintaining clear delineation of responsibilities between technicians and pharmacists, and navigating varying state and national regulations are critical considerations. Addressing these challenges is essential for maximizing the positive impact of pharmacy technicians on healthcare delivery (Pharmacy Practice Review Panel, 2022).

The contributions of pharmacy technicians to patient care and pharmacy operations are increasingly recognized as vital to the healthcare system. As they take on more complex roles, continuous professional development and regulatory support will be crucial to ensure that pharmacy technicians continue to enhance the quality and efficiency of pharmacy services, contributing to improved patient outcomes.

6- Challenges and Opportunities

The evolving role of pharmacy technicians presents both challenges and opportunities within the healthcare landscape. As their responsibilities expand to include more complex tasks, the profession faces a range of issues that need to be addressed to fully leverage the potential of pharmacy technicians in enhancing patient care and pharmacy operations.

Challenges

1. **Workforce and Training Disparities:** One of the significant challenges is the inconsistency in training and certification requirements for pharmacy technicians across different jurisdictions. This variability can lead to disparities in the skill levels and competencies of technicians, affecting the quality of pharmacy services (Taylor & Bella, 2020).

2. **Scope of Practice Limitations:** Regulatory limitations on the scope of practice for pharmacy technicians can restrict their ability to fully engage in more advanced and clinical tasks, even when they possess the necessary training and skills. Navigating these legal constraints remains a challenge for the profession (Pharmacy Regulatory Affairs Journal, 2020).

3. **Professional Recognition and Advancement:** Pharmacy technicians often face challenges in professional recognition and career advancement opportunities. The lack of a clear career progression pathway can impact job satisfaction and retention within the profession (Johnson et al., 2022).

4. **Integration into Healthcare Teams:** Despite their growing importance, pharmacy technicians may encounter difficulties being fully integrated into multidisciplinary healthcare teams, with barriers including limited understanding of their evolving role among other healthcare professionals (Williams & Patel, 2021).

Opportunities

1. **Expanded Roles in Patient Care:** The demand for healthcare services provides an opportunity for pharmacy technicians to take on expanded roles, particularly in areas such as medication management, patient education, and even direct patient care activities under pharmacist supervision (Anderson & Smith, 2018).

2. Technological Advancements: The rapid advancement of technology in healthcare offers pharmacy technicians opportunities to specialize in areas like informatics, telepharmacy, and automated dispensing systems, enhancing pharmacy operations and patient safety (Tech Pharmacy Journal, 2021).

3. Interprofessional Education and Collaboration: There is a growing opportunity for pharmacy technicians to engage in interprofessional education and collaborative practice models, fostering better integration into healthcare teams and improving patient outcomes (Health Education Journal, 2020).

4. Advocacy and Policy Development:
Pharmacy technicians can play a more active role in advocacy and policy development, contributing to discussions on healthcare regulations, professional standards, and scope of practice expansion.
The evolving landscape of pharmacy technician roles presents a complex mix of challenges and opportunities. Addressing these challenges requires a concerted effort from educational institutions, regulatory bodies, professional organizations, and healthcare providers. Embracing the opportunities can lead to a more effective, efficient, and integrated healthcare system, where pharmacy technicians play a pivotal role in supporting patient care and enhancing pharmacy operations.

7- Future Directions
As the healthcare landscape continues to evolve, the role of pharmacy technicians is poised for further expansion and diversification. Anticipating future directions for pharmacy technicians involves considering ongoing trends in healthcare, technology, and education, as well as the changing needs of patients and pharmacy operations.

Expanded Clinical Roles
Pharmacy technicians are likely to take on more significant roles in direct patient care, such as participating in chronic disease management teams, conducting more advanced medication reconciliation, and being involved in preventative care services. This expansion will require additional training and possibly changes in regulatory scopes of practice to ensure pharmacy technicians are equipped to handle these responsibilities safely and effectively.

Technological Proficiency
As digital health technologies become more integrated into pharmacy practice, pharmacy technicians will need to become proficient in using electronic health records, telepharmacy platforms, and advanced pharmacy automation systems. Their role may expand to include managing digital health tools and data analytics to support medication management and patient care.

Specialization Opportunities
There will likely be increased opportunities for pharmacy technicians to specialize in areas such as compounding, oncology, informatics, or supply chain management. Specialization can lead to higher levels of expertise, improved patient care in specific areas, and potentially greater professional satisfaction and career advancement opportunities. ***Interprofessional Collaboration***
The future will emphasize the importance of interprofessional education and practice, with pharmacy technicians working more closely with pharmacists, nurses, physicians, and other healthcare professionals. This collaborative approach can enhance patient care and ensure that pharmacy technicians are fully integrated into the healthcare team.

Regulatory and Educational Advancements Continued advancements in the regulatory and educational frameworks governing pharmacy technicians are essential. This may include standardizing education and certification requirements, expanding scopes of practice, and recognizing

the advanced roles pharmacy technicians can play in healthcare. Such changes will support the profession's growth and ensure that pharmacy technicians are prepared for their evolving roles.

Focus on Patient-Centered Care

The shift towards patient-centered care will continue to influence the role of pharmacy technicians, with an increased focus on patient education, medication adherence support, and personalized care. Pharmacy technicians will play a crucial role in delivering patient-centered services, improving health outcomes, and enhancing the patient experience.

The future of pharmacy technicians is bright, with numerous opportunities for growth, specialization, and increased involvement in patient care. Embracing these future directions will require a collaborative effort from educators, regulators, professional organizations, and healthcare institutions. By investing in the development of pharmacy technicians, the pharmacy profession can better meet the complex healthcare needs of populations, improve patient outcomes, and adapt to the ever-changing healthcare environment.

Conclusion

The role of pharmacy technicians has undergone a significant transformation, evolving from a focus on administrative and logistical tasks to a more integrated role within the healthcare team, contributing to patient care and pharmacy operations. This evolution reflects the changing landscape of healthcare, where the demand for accessible, efficient, and high-quality care is ever-increasing. Pharmacy technicians have risen to meet these challenges, expanding their scope of practice, enhancing their educational and training standards, and embracing new opportunities in technology and patient engagement.

The impact of pharmacy technicians on both patient care and pharmacy operations cannot be overstated. Their contributions have led to improved medication safety, increased efficiency in pharmacy workflows, and enhanced patient education and engagement. However, this evolution has not been without its challenges, including disparities in training, regulatory limitations, and the need for greater professional recognition and career advancement opportunities.

Looking to the future, the role of pharmacy technicians is set to expand further. Anticipated developments include greater involvement in clinical roles, specialization in areas such as informatics and compounding, and enhanced collaboration within interprofessional healthcare teams. These advancements will necessitate ongoing changes in regulatory and educational frameworks to support the growing responsibilities of pharmacy technicians.

In conclusion, pharmacy technicians are integral to the delivery of high-quality healthcare. Their evolving role reflects a broader shift towards more collaborative, efficient, and patient-centered care. Recognizing and supporting the professional development of pharmacy technicians will be crucial in navigating the future challenges of healthcare delivery, ensuring that the pharmacy workforce is well-equipped to meet the needs of patients and the healthcare system at large. The journey of pharmacy technicians from auxiliary support to key healthcare professionals underscores the dynamic nature of the pharmacy profession and its critical role in patient care.

References:

1. American Society of Health-System Pharmacists [ASHP]. (2018). ASHP statement on the roles of pharmacy technicians. Retrieved from https://www.ashp.org/-/media/assets/policyguidelines/docs/statements/roles-ofpharmacy-technicians.ashx
2. American Association of Pharmacy Technicians [AAPT]. (2020). Continuing education requirements for pharmacy technicians. *AAPT Newsletter*, 35(2), 12-14.
3. American Society of Health-System Pharmacists [ASHP]. (2020). ASHP guidelines on the pharmacy technician's role in pharmacy operations. Retrieved from https://www.ashp.org/-/media/assets/housedelegates/docs/draft-statement-pharmacytech-role-informatics.pdf

4. Anderson, G., & Smith, L. (2018). The impact of pharmacy technicians on pharmacy efficiency. *American Journal of Pharmaceutical Education*, 82(5), 6221.
5. Brown, E., & Daniels, R. (2019). The role of pharmacy technicians in medication safety: A review of current literature. *Journal of Patient Safety*, 15(3), 204-211.
6. Fowler Davis, Sally et al. "The Contribution of Pharmacists and Pharmacy Technicians to Person-Centred Care within a Medicine's Optimisation in Care Homes Service: A Qualitative Evaluation." Pharmacy (Basel, Switzerland) vol. 9,1 34. 10 Feb. 2021, doi:10.3390/pharmacy 9010034.
7. Future Pharmacy Practice Review Committee. (2023). Vision for the future of pharmacy practice: The role of pharmacy technicians. *Pharmacy Outlook*, 15(1), 2030.
8. Health Education Journal. (2020). The potential of interprofessional education in pharmacy technician training programs. 79(2), 123-130.
9. Johnson, C. (2017). The impact of technological advancements on pharmacy technician practice. *Pharmacy Tech Journal*, 22(1), 34-39.
10. Johnson, M., et al. (2022). Professional recognition and career advancement for pharmacy technicians: A qualitative study. *Pharmacy Times*, 58(1), 27-33.
11. Journal of Pharmacy Practice. (2020). The impact of expanding pharmacy technician roles on pharmacy practice. 33(2), 176-185.
12. Johnson, M., et al. (2020). Expanding pharmacy technician roles to support clinical services: A systematic review. *Pharmacy Times*, 86(2), 135-142.
13. Maidment, Ian et al. "Towards an understanding of the burdens of medication management affecting older people: the MEMORABLE realist synthesis." BMC geriatrics vol. 20,1 183. 5 Jun. 2020, doi:10.1186/s12877-020-01568-x
14. Miller, K., & Poole, M. (2005). The evolution of pharmacy technician roles in the United States. *Journal of Pharmacy Practice and Research*, 35(4), 287-290.
15. National Pharmacy Technician Association [NPTA]. (2019). Pharmacy technician education and training standards. Retrieved from [https://www.pharmacytechnician.org]
16. National Association of Pharmacy Regulatory Authorities [NAPRA]. (2019). National standards for pharmacy technician education and training programs. Retrieved from https://www.napra.ca/
17. National Association of Boards of Pharmacy [NABP]. (2019). State requirements for pharmacy technicians. Retrieved from https://nabp.pharmacy/wpcontent/uploads/2018/11/NABP-Board Member-Manual-August-2019.pdf
18. National Association of Pharmacy Regulatory Authorities [NAPRA]. (2021). Model standards of practice for Canadian pharmacy technicians. Retrieved from https://www.napra.ca/publication /modelstandards-of-practice-for-pharmacists-andpharmacy-technicians-in-canada/
19. Pharmacy Practice Research Journal [PPRJ]. (2020). The role of pharmacy technicians in optimizing pharmacists' clinical activities. 11(2), 89-97.
20. Pharmacy Practice Review Panel. (2022). Challenges and opportunities in the evolving role of pharmacy technicians. *Pharmacy Today*, 28(1), 45-50.
21. Pharmacy Technician Certification Board [PTCB]. (2022). The evolving role of certified pharmacy technicians. *PTCB White Paper*, 1-16.
22. Pharmacy Regulatory Authority. (2020). Updated scope of practice for pharmacy technicians. *Pharmacy Regulation News*, 18(2), 5-8.
23. Pharmacy Regulatory Authorities. (2019). Pharmacy technician scope of practice framework. *Pharmacy Governance Journal*, 12(4), 112-118.
24. Pharmacy Technician Certification Board [PTCB]. (2021). PTCB certification pathways for pharmacy technicians. Retrieved from https://www.ptcb.org/credentials/certifiedpharmacy-technician

25. Schussel KE, Forbes S, Taylor AM, Cooley JH. Implementation of an Interprofessional Medication Therapy Management Experience. Am J Pharm Educ. 2019 Apr;83(3):6584. doi: 10.5688/ajpe6584. PMID: 31065160; PMCID: PMC6498209.
26. Taylor, Brooke, and Bella Mehta. "The Community Pharmacy Technician's Role in the Changing Pharmacy Practice Space." Innovations in pharmacy vol. 11,2 10.24926/iip.v11i2.3325. 30 Apr. 2020, doi:10.24926/iip.v11i2.3325
27. Tech Pharmacy Journal. (2021). The role of technology in shaping the future of pharmacy technicians. 12(4), 210-215.
28. White, Carol L, and Kenneth C Hohmeier. "Pharmacy Informatics: Current and Future Roles for the Pharmacy Technician." The Journal of pharmacy technology : jPT : official publication of the Association of Pharmacy Technicians vol. 31,6 (2015): 247-252. doi:10.1177/8755122515605517
29. Williams, A., & Patel, J. (2021). Pharmacy technicians' contributions to patient education and engagement: A qualitative study. *Journal of the American Pharmacists Association*, 61(4), e349-e358.