ESP-JETA
ESP Journal of Engineering & Technology Advancements
ISSN: 2583-2646 / Volume 3 Issue 3 September 2023 / Page No: 163-173
Paper Id: JETA-V3I7P120 / Doi: 10.56472/25832646/JETA-V3I7P120

Original Article

Patient Engagement Strategies in Community Pharmacies and their Effect on Vaccination Uptake and Medication Synchronizations

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Received Date: 06 August 2023 Revised Date: 31 August 2023 Accepted Date: 29 September 2023

Abstract: *Patient engagement strategies are also used by community pharmacies and they are very crucial in improving vaccination and medication synchronization. The concept of patient activation is supported by a number of theoretical frameworks, such as the Health Belief Model, the Theory of Planned Behaviour, and the Patient Activation Measure, which all postulate the involvement of patients in their own healthcare (emotionally, behaviourally, and cognitively). Pharmacists achieve maximum engagement by providing specific interventions, establishing trust, addressing vaccine hesitancy, and promoting the use of preventive services. Education campaigns, outreach into the community, reminder systems, incentivized or compulsory vaccination and operational preparedness to ensure availability of vaccines are among some of the strategies. Effective communication, culturally appropriate messages and collaboration with community leaders and healthcare providers can also be used to strengthen participation. The intention-uptake gap is seen all over the world with the COVID-19 vaccination programs and the situational strategies need to be adopted. In general, patient engagement in community pharmacies promotes medication adherence, builds trust, and long-term preventive health care outcomes, and it should be applied in the public health effort*

Keywords: *Patient Engagement, Community Pharmacy, Vaccination Uptake, Medication Synchronization, Preventive Healthcare, and Pharmacy Interventions.*

I. INTRODUCTION

Community pharmacists have contributed greatly to the world, but it has changed into a wider set of activities in terms of dispensing medication and the participation in extensive involvement in community health services and management of diseases. Community pharmacists are currently involved in the management of long-term conditions, medication reviews, preventive healthcare, and vaccination services, making them essential stakeholders in enhancing population health outcomes. As various studies have indicated, pharmacist-led programs during chronic disease management can lower the cost of healthcare, clinical outcomes, and patient satisfaction [1]. The maximum potential of public health services based on community pharmacy is however not fully exploited as there are still systemic and operational barriers. A number of determinants are barriers to the successful provision and access of community pharmacies to the services of public health [2][3]. Community pharmacists have a clear advantage amid these difficulties as they are experts with specialization in the field of medication use, safety, and optimization that would provide easy-to-acquire and patient-centered healthcare services.

COVID-19 has shown the significance and the durability of the community pharmacy services. During this period, the community pharmacies still played a vital role in healthcare accessibility and, in many cases, served as the frontline to the patient. The pandemic added to the load of work, such as the significant growth of prescription volumes and the enlarging of work on the population health programs in the form of vaccination against influenza and COVID-19 [4]. Such requirements have highlighted the necessity to gain a deeper insight into the existing resources, skills, and engagement strategies that the community pharmacies need to have to play an important role in the countrywide vaccination program.

Patient engagement has become an essential part of high-quality patient-centered healthcare and, specifically, pertinent to immunization. Historically, healthcare systems were paternalistic, restricting patients' participation in decision-making. Nonetheless, the shift towards shared decision-making and active patient involvement has become the paradigm due to healthcare reforms, social change, and technological advances in communication [5]. Informed decision-making, a shared clinician-patient responsibility, feedback, co-production of services, and wider participation in health system planning are some of the key areas of patient engagement today [6]. Pharmacists are often viewed as dependable healthcare professionals, and a place of entry to the healthcare system. This availability places community pharmacies as the optimal locations to offer vaccination services and provide vaccine-related issues with personalized counselling and education.

Nevertheless, even though the development of vaccines and proven safety and efficacy of COVID-19 vaccines are rather rapid, vaccine hesitancy poses a significant obstacle to ensuring maximum immunization coverage worldwide [7][8]. In that

regard, community pharmacists need to be effective in engaging patients in order to enhance their confidence with vaccines, eliminate misinformation, and boost vaccination. It is thus important to understand the nexus among pharmacist-led service, patient engagement strategy, and vaccination outcomes to enhance the process of improving the public response to health issues during and after the COVID-19 pandemic.

A. Structure of the Paper

This paper is structured in the following way. Section II describes the conceptual framework of patient engagement, including its definitions, dimensions, and theoretical models. Section III elaborates on the different patient engagement tactics employed in community pharmacy, with a major focus on interventions that improve vaccination uptake and medication synchronisation. Section IV examines the connection between engagement and vaccine acceptance, and it also indicates the role played by the effect of risk perception, trust and social support. Section V reviews the literature related to the study. Lastly, Section VI presents findings and recommendations on the future research, as it also highlights the opportunities of context-specific and technology-driven methods to improve patient engagement even more.

II. CONCEPTUAL FRAMEWORK OF PATIENT ENGAGEMENT

The engagement of patients is a multidimensional concept that implies the cognitive, behavioral, and emotional participation in the healthcare process, and it is supported by such theoretical models as the Health Belief Model, Theory of Planned Behavior, and Patient Activation Measure. The involvement of patients in community pharmacy practice provides better knowledge, trust, and adherence to preventive healthcare services such as vaccinations and medication synchronization. Pharmacists can promote positive long-term health behaviors by meeting the needs of the individuals.

A. Definition and Dimensions of Patient Engagement

The term patient engagement denotes the extent to which people are actively participating in their health management and involved in making decisions connected to healthcare. It is generally widely conceptualized as a multidimensional construct of cognitive, behavioral, and emotional levels. Cognitive engagement is associated with patients' knowledge, awareness, and comprehension of conditions, treatments, and preventive health measures. Behavioral engagement encompasses the observable behavior, which includes taking prescribed drugs, attending preventive services and the acceptance of recommended vaccinations. The emotional engagement is the manifestation of attitudes that patients have towards healthcare, such as trust in providers, motivation, confidence and perceived support. When the dimensions are also synergistic, effective patient engagement is achieved, which leads to making informed decisions and positive long-term and long-lasting health behaviors.

B. Theoretical Models Supporting Engagement

There are theoretical models of patient engagement as follows:

a) Health Belief Model (HBM)

The HBM was developed in the 1950s by the USPHS and is now a popular framework for understanding health behaviour. Tuberculosis screening with chest x-rays, the necessity of vaccination, and the community's underutilisation of services were all addressed by the approach. Based on the psychologists' hypothesis, the model predicts that community members perceive health risks during diagnostic chest X-rays and anticipate a reduction in dread through vaccination. An individual's decision to take action to reduce health risks is based on their assessment of the benefits of changing their behavior [9]. Interpersonal decision-making around screening, immunisation, surgery, and the cessation of hazardous behaviours are typical topics of investigation when this model is employed.

b) Theory of Planned Behavior (TPB)

The Theory of Planned Behaviour (TPB) adds to what is already known by focusing on how attitudes, subjective standards, and the sense of behavioural control affect plans and actions [10][11]. Social expectations, the advice of reliable medical professionals (such as chemists), and individuals' beliefs about their own abilities to access and make use of vaccination services are all heavily weighted in TPB's vaccination framework.

c) Patient Activation Measure (PAM)

The goal of the PAM is to assess an individual's level of competence in health self-management. There is a correlation between patient activation and improvements in preventative care and treatment adherence [12]. PAM can provide a pragmatic guide to determining the readiness of patients and designing the engagement strategy to promote the informed-decision-making process and long-term participation in vaccination and other public health initiatives.

C. Role of Patient Engagement in Medication Synchronisation

Patient engagement is part of the prevention care outcome in community pharmacy practice, such as vaccination coverage and medication synchronization. The close, frequent communication that pharmacists have with patients positions them to influence cognitive knowledge, promote good health, and build emotional trust. Using engagement-based strategies

based on behavioural theory, pharmacists are able to adjust interventions to the needs of each patient, manage hesitancy, and encourage long-term engagement in pharmacy-based healthcare services.

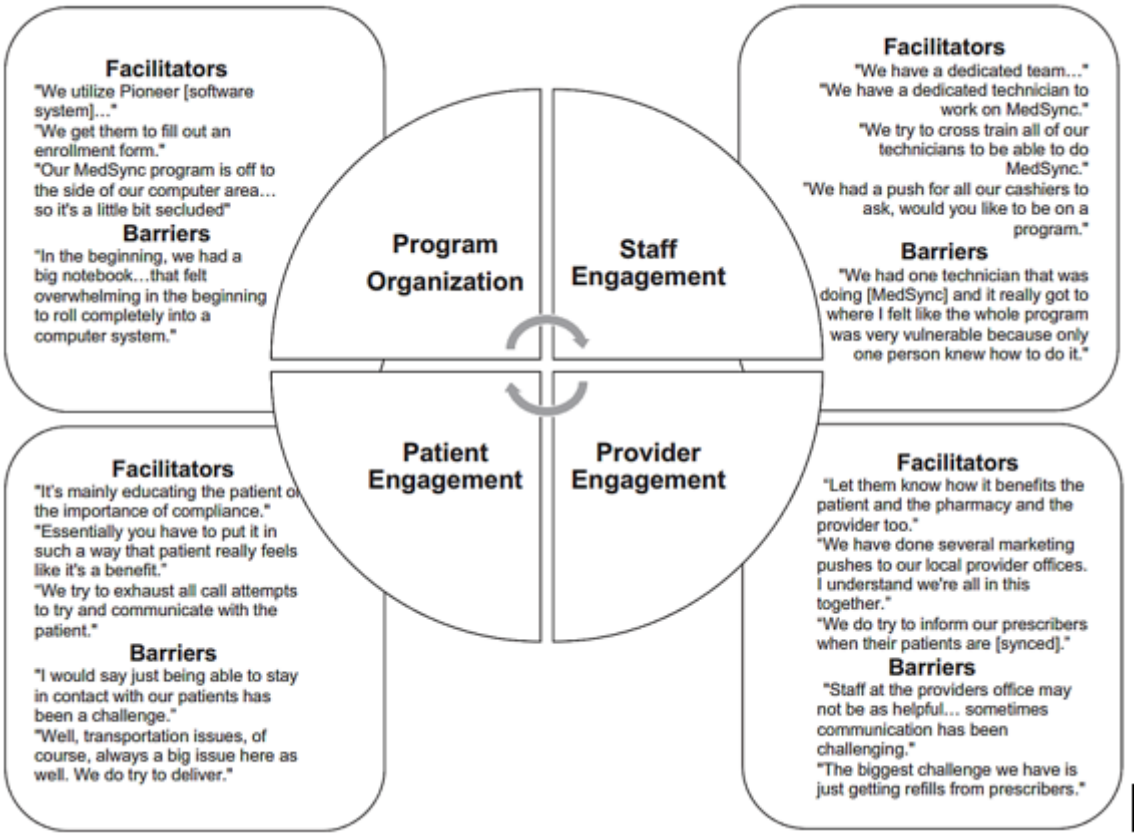

Figure 1 : Patient Engagement in Medication Synchronisation

Pharmacies around the nation are implementing med sync programs, which allow patients to conveniently pick up all of their chronic prescriptions at the same time. A problem that is predicted to cost the health care system around $300 billion annually due to unnecessary patient health problems is medication adherence, which med sync services address. The process underlying patient involvement in medication synchronization is illustrated in Figure 1, which shows how pharmacists' conversations with patients and personalised measures lead to patient adherence, trust, and smoother pharmacy operations. Because patients no longer have to keep track of when they need to request medication refills, adherence is improved with the help of Med sync. Another benefit is that it reduces the number of times the patient needs to visit the pharmacy [13][14]. Medical sync's primary benefit for community pharmacies is the ability to proactively choose a day and time of week for the simultaneous filling of all patients' chronic prescriptions. In turn, this helps with staffing and inventory ordering since the pharmacy can anticipate its prescription load. With these benefits in place, patients no longer need to fill their prescriptions on demand, allowing chemists more time to focus on patient care and other therapeutic initiatives.

III. PATIENT ENGAGEMENT STRATEGIES IN COMMUNITY PHARMACIES

Community pharmacists are highly involved in engaging the patient as they are capable of giving informed and confident recommendations, which are in line with the prevailing immunization guidelines. Regular screening at the dispensing point enables the pharmacists to recognize the right patients and engage them in timely vaccination negotiations. Immunization records can be accessed to promote individualized recommendations and follow-up. Effective communication and education that involves busting myths enhances patient trust and acceptance towards fighting vaccine hesitancy. Together, these engagement strategies ensure the effectiveness of community pharmacies and their accessibility to improve the rate of immunization.

A. Strategies to Increase Vaccine Uptake

Education, information campaigns, community involvement, laws that reward vaccination or punish those who do not get vaccinated are all possible examples of actions that can be taken by both the government and other organizations to promote vaccine uptake.

a) Education and Information Campaigns.

Public education and information programs are of great help in supporting informed decision-making in regard to vaccinations. These efforts are to enhance awareness of the benefits of the vaccines, eliminate misinformation and anxiety about safety and effectiveness. One of the most important instruments in these actions is healthcare workers, because the words of a credible professional have a significant impact on vaccination decisions. A drawback of effective communication, however, is the lack of time and the pressures of work, as well as the inconsistency in the confidence of healthcare workers when discussing vaccine-related issues. The capacity of medical professionals to hold meaningful vaccine conversations can be improved by strengthening their communication skills and providing evidence-based resources [15]. Besides that, partnerships with community groups, religious communities, and social leaders can be used to widen the range of the vaccination messages and enhance their acceptance among various groups of the population.

b) Incentivised and Mandatory Vaccination.

Countries are promoting vaccination efforts, as in most of them, vaccines are provided to citizens at no direct expense, thus eliminating financial challenges. In other settings, incentives are offered or policy interventions are implemented to promote immunisation, including the conditionality of immunisation status on the availability of particular services, work environments, or travel. Such measures ought to be applicable, reasonable, and ethically warranted when applied so as not to harm the trust of the populace or their autonomy [16]. Coverage in certain settings might be enhanced by mandatory or conditional vaccination policies, but these policies might also raise ethical and social issues. Thus, the methods tend to be accompanied by the strategies of engagement and education in order to make them acceptable and sustainable.

c) Community Engagement.

One more feature of successful work on vaccination is community involvement, particularly in the context of eliminating vaccine inequality. Local participation programs help to put in place viable hindrances, contextualize situational problems, and counteract news through reliable sources. The participation of the community leaders, local organisations, and known people results in building trust and culturally appropriate communication. Enhance transparency and accountability through participatory measures such as community consultations on vaccination services, planning and evaluation of the vaccination programs. The strategies would be especially important when it comes to reaching marginalized or underutilized populations and building confidence in vaccination and other public health interventions over the long term.

B. Strategies to Improve Engagement.

Vaccine acceptability and adoption have been hot topics recently (Figure 2). Community pharmacists can increase vaccination rates and better inform patients about available vaccines by using a variety of patient engagement strategies.

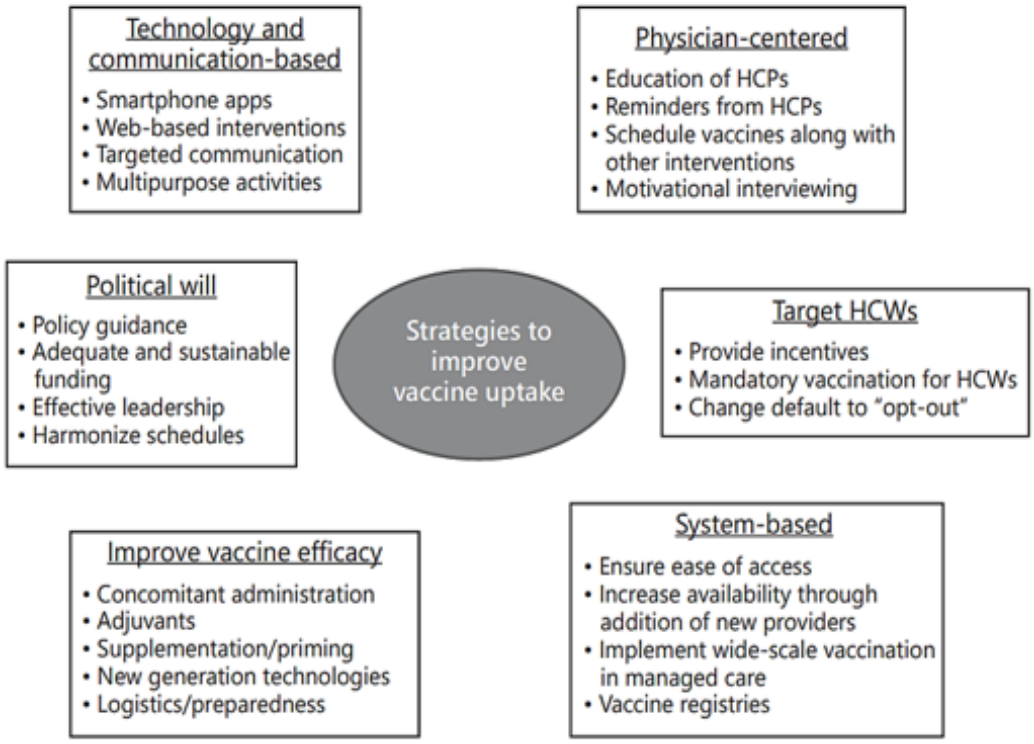

Figure 2 : Strategies to Improve Vaccine Uptake

- Timely outreach is informed by positive communication, pharmacy support, outreach programs and appropriate promotion strategies.
- Reminder-based interventions play a crucial role in persuading patients to follow and stick to the recommended vaccination schedules.
- Face-to-face and telephone and text meetings with patients would assist in enhancing patient adherence to multi-dose vaccinations and decrease the proportion of vaccinated patients who missed or delayed immunizations. These alerts develop power in the prompt immunization and continuity of care [17].
- Patient engagement can also be achieved by the presence of pharmacy teams in interventions with the inclusion of trained pharmacy technicians.
- Technicians usually spend prolonged time with the patients during regular pharmacy visits and can help to define those who could fit the criteria of vaccinations. Their activity facilitates the effective workflow and enables pharmacists to pay more attention to clinical evaluation, vaccination prescriptions, and counseling the patients [18].
- Marketing and communication practices at in-pharmacy also lead to better engagement. Graphical material (posters, signs and information leaflets) can sensitize patients on the existence of vaccines.
- Vaccination information accompanied by prescription services motivates patients to communicate with the pharmacy personnel and facilitates preventive care during regular pharmacy visits.
- Community outreach efforts increase the involvement outside the pharmacy. Attending health fairs, in-service clinics, and periodic immunization programs enhances access to vaccines, especially to people who might not visit health facilities frequently.
- The cooperation with local health organizations and public health agencies helps pharmacists to work with high-risk groups and educate and provide community services to promote vaccination.
- Lastly, patient engagement is supported with operational preparedness, such as having sufficient inventory of vaccines, so patients have access to recommended vaccines immediately.

C. Implementing the Strategy of Interventions to Support COVID-19 Vaccine Uptake

The following are some potentially important steps that could be made to help put the Six-Point Strategy into action. Methods that aim to alter the system, build trust in the community via clear and consistent messaging, and open doors to vulnerable populations are all part of this category.

a) Program Strategy and Provider Strategy

The most successful delivery of vaccines depends on the involvement of various healthcare professionals and enhancing the working force. To provide culturally appropriate and trusted vaccination services, it is necessary to incorporate meaningful work of healthcare workers at the community level including Indigenous and marginalized populations. Making wider provider accreditation possible and having flexibility in immunisation training models can be able to increase participation in the workforce, especially in rural and underserved regions [19][20]. The population of nurses is a significant percentage of the primary healthcare workforce and significantly contributes to vaccine recommendations and delivery. Improving their access to immunisation information systems and registers can facilitate proper documentation, continuity of care and population-level monitoring. The enhancement of provider role by training, system access and scope of practice support is the basis of maintaining high levels of vaccination.

b) Access Strategy

To enhance the vaccine uptake, the simplification of access and the proximity of services to people living, working, and interacting in areas are needed. The logistical barrier can be reduced through flexible delivery models of service delivery, including longer time, clinic days off, at the workplace or community level to carry out vaccination, and home visits to vulnerable groups. The combination of COVID-19 vaccination with already implemented adult immunisation programs and regular healthcare experiences presents the ability to deal with missed or delayed immunization. Prompts, recalls, and targeted outreach to individuals at risk or with low engagement are reminder-based interventions that are especially effective in eliciting vaccine intent and improving coverage. There is also evidence that reminder systems can significantly increase vaccination rates.

c) Broad and Tailored Communication Campaigns

Vaccine acceptance is focused on communication strategies that effectively convey the vaccine's benefits, eligibility, safety, and access routes. General-level campaigns are supposed to enhance the overall consciousness and socialize the idea of vaccination as a community health duty with the focus on family and community protection. Universal messaging on its own, however, might not be enough to reach out to or stimulate all populations. Vaccine skepticism, cultural diversity, and disparities can be addressed by disease-specific communication tactics [21]. A variety of trustworthy representations and varied vehicles, including digital platforms, traditional media outlets, and community-based ones, are necessary for such approaches to be satisfied. Increased message reach, trust, and consistency are the results of collaborations with healthcare stakeholders, advocacy groups, and civil society organizations.

d) Community and professional engagement

The informed and motivated employees of the health care could become tremendous promoters of immunisations in the health care facility. This, not to mention that the audiences could be affected by other opinion formers differently. The community's role in developing the vaccination service process is critical to developing a sense of responsibility and commitment. Other supporters other than the traditional healthcare providers also have the ability to promote the COVID-19 vaccination. They may perhaps include:

- Community leaders (including elders)
- Community-based traditional health providers
- Officials from religious organisations and religiously related groups
- Social (community) membership (e.g. youth organisations or mothers' groups)
- Unions/associations

The leaders of religious and traditional communities can tell the population about the necessity of immunisation and provide helpful information such as the time and location where to receive vaccinations. These leaders must read written materials on immunisation and other health concerns after religious services and announcements of the community. Engage with community partners in microplanning and reviews of the program on a regular basis. These enable us to collect data on the existing perception of services by the community, train local leaders on program and hold events that unite people and address key issues.

e) Vaccine Encounter Support

The vaccine experience is a subjective variable that predetermines the level of acceptance, trust, and future results. The absence of an efficient communication method or confrontation techniques may reduce confidence, even in vaccine-resistant individuals. The contrary is, though,, the enlightening, sympathetic and patient-centred communication, which creates the feeling of trust and allows making an informed decision [22]. A good and favorable recommendation by a trusted healthcare specialist is one of the most important predictors of vaccination. Communication and motivational training of trainers can enhance the quality of consultations, as well as increase the resilience of the program. The inclusion of more and more health professions in education relating to vaccines beneficial in ensuring that the message remains consistent and the awareness of the necessity to vaccinate spreads across the entire healthcare system.

IV. IMPACT OF PATIENT ENGAGEMENT ON VACCINATION UPTAKE

Patient involvement is a significant factor in the process of vaccination because it determines risk perceptions, information interpretation, social factors, and trust in the healthcare system. The studies recommend context-specific engagement strategies to address the gap between the intention and actual uptake of vaccination in the community.

A. Factors Influencing Vaccine Uptake

There are many factors that influence the ability and desire of people to accept the offers of vaccination against themselves or their children; this choice may be default or proactive.There are Benefits of Vaccination Uptake as follows:

Individuals get the most from vaccinations when they are able to avoid contracting diseases and infections and when they are able to reassure themselves and those, they care about that they are protected. People may appreciate the chance to help safeguard others in their larger social or community when immunisation lowers the transmission of disease. It is possible to provide some populations with a vaccine that protects more people than they do themselves [23]. For instance, pregnant women can receive a whooping cough vaccine, and all children are vaccinated against rubella and mumps, two diseases that can have a significant impact on fertility and sperm count, respectively. Individuals may also gain from taking part in public health initiatives aimed at disease prevention. The fact that people's views of the COVID-19 risk to others were linked to their intention to get vaccinated suggests that altruism is a factor in vaccination decision-making, according to early research on attitudes towards a possible COVID-19 vaccine.

B. Risk Perception and Uncertainty

Risk perception has a great impact on vaccine decision-making. Although vaccines are strictly reviewed in terms of their safety and effectiveness, issues about side effects, long-term consequences, or novel vaccine technologies may be viewed as the source of hesitancy. These issues tend to be influenced by how risks are presented and perceived rather than by scientific evidence. Uncertainty can be effectively managed through clear communication, empathy, and consideration of concerns, along with clarity about benefits and risks. Individual-based conversations taking into account the health situation are more effective than generalized messages, particularly in groups with an increased risk of being vulnerable to uncertainty.

C. Source of Information and Social Influence

The attitudes and behaviours of individuals seeking information about vaccines depend heavily on the source of that information. Data shared by medical practitioners and respected members of society is mostly linked to increased vaccine

acceptance. Confusion and misinformation can be overcome through engagement strategies that provide easy-to-understand, readily available, and culturally relevant information. Social networks and digital platforms are increasingly influencing perceptions of vaccines. Although they can boost information dissemination, they can also amplify misinformation. The negative impact caused by misleading or conflicting messages has to be reduced with the help of active patient communication, such as timely counselling and sharing credible information.

D. Trust in Healthcare System and Providers

One of the determinants of vaccination is trust. Trust in healthcare providers, delivery systems and motives behind immunisation programs makes people more prone to accept vaccines. The patient's involvement enhances trust through respectful communication, continuity of care, and positive healthcare experiences. Absence of trust- The trust may be compromised due to past negative experiences, a belief in unfairness, and suspicion of a specific institution's motives. Strategies that prioritise transparency, inclusivity, and community engagement can reestablish confidence and promote long-term participation in vaccination programs.

E. Integration of Engagement Strategies for Outcomes

An international and transnational viewpoint regarding COVID-19 vaccines' acceptance, rejection, and use among different population groups. The table indicates a continuous difference between the vaccination intention and the actual vaccination at the global level which might be the reason to utilize efficient patient engagement methods [24]. Differentiation between countries also that the degree of trust in healthcare systems, particular communication, and access are other factors that influence the vaccination outcomes. All in all, the evidence presented in Table I emphasizes the importance of adopting population-tailored engagement methods and approaches which should be contextualized in order to boost vaccination uptake

Table 1 : Global and Cross-Country Outcomes of COVID-19 Vaccination Acceptance

Category	Population / Country Group	Acceptance (%)	Unwillingness (%)	Uptake (%)	Implications for Engagement Strategies
Global (Pooled)	All populations	67.8	20.4	42.3	Indicates intention–behavior gap; requires integrated reminders, access facilitation, and trust-building
Global (By Population)	Children & adolescents	70.7	19.8	37.9	Family-centered communication and school-based engagement
	Adults	69.1	19.8	39.7	Workplace vaccination, pharmacy-led counseling, digital reminders
	University students	67.7	20.7	43.7	Peer influence, social media campaigns, campus clinics
	Healthcare workers	67.5	19.8	54.1	Professional education, leadership endorsement
	Chronic disease patients	67.4	16.9	39.3	Personalized risk communication and clinician engagement
	Pregnant/breastfeeding women	54.0	41.9	7.3	Safety-focused counseling and specialist reassurance
Cross-Country (Adults)	High acceptance countries (>80%)	80–87	Low	High	Strong trust, effective communication, high system readiness
	Moderate acceptance (70–80%)	70–80	Moderate	Moderate	Targeted community and provider engagement needed
	Low acceptance (<60%)	36–59	High	Low	Trust deficits and access barriers; intensive engagement required
Cross-Country (HCWs)	Highest acceptance	Up to 97.7	Very low	High	Institutional trust and strong professional advocacy
	Lowest acceptance	~27	High	Low	Need for workforce-specific engagement and education

Cross-Country (Special Groups)	Chronic disease patients (range)	29–90	Variable	Moderate	Condition-specific messaging and continuity of care
	Pregnant/breastfeeding women (range)	25–79	High	Very low	Tailored safety communication and obstetric engagement
	University students (range)	27–93	Variable	Moderate	Digital and peer-led interventions
	Children & adolescents (range)	36–95	Variable	Moderate	Parent-focused engagement strategies

V. LITERATURE REVIEW

The literature reviewed in Table II highlights the growing importance of patient and community engagement in improving vaccination uptake, medication adherence, and healthcare safety across diverse settings. Collectively, these studies demonstrate that theory-driven, trust-based, and context-specific engagement strategies, particularly within community pharmacy practice, play a critical role in influencing patient behaviour and strengthening preventive healthcare outcomes.

Gilmore et al. (2022) An initial systematic review and biweekly review updates carried out as part of the systematic review process. Search and filter for the review and updates using four streams: citizen sourcing, a systematic search of six databases, and a grey literature review. Additionally, review preprints. At least two reviewers use the systematic review management software Covidence to screen the titles, abstracts, and full texts. Article details, population and context, community engagement strategies, and results all be part of the data that retrieved in an Excel spreadsheet using specified fields. Using the convergent integrated technique, synthesis takes place. Investigate the possibility of quantitatively synthesising main conclusions, taking into account the heterogeneity of the investigations [25].

Merks et al. (2022) An anonymous questionnaire was given to patients following immunisation as a research tool. For this study, the questionnaire was tailored especially. The total number of patients who took part in this research was 628. The vast majority of respondents (nearly 97%) felt that pharmacists were well-equipped to administer vaccinations, and they also thought that it had been convenient. Nearly 90% of those who took the survey said they would be open to getting vaccinated again if chemists offered it. Nearly all the respondents indicated that pharmacists should also provide other vaccinations. Polish patients are generally supportive of vaccines given by pharmacists at government-run clinics [26]

Dutta et al., (2020) The purpose of this study was to gain a common knowledge of community engagement's growing conceptualisation and its promotion during India's Decade of Vaccines (2010-2020) by interviewing vaccination decision makers in the country. Twenty-five policymakers, leaders of immunisation programs, and executives of vaccine technical committees in India were interviewed using semi-structured interviews. The 'elite' position of the decision-makers in the Indian vaccine space was used to identify the participants. The Social Ecological Model served as the basis for the a priori framework that was developed in accordance with Schutz's Social Phenomenological Theory. Participants' ideas about communities, community engagement, and other topics were better organised with the framework. Results were confirmed in a one-day team and participant check-in meeting after inter-rater reliability was calculated for a subset of coded interviews [27].

Ecarnot, Maggi and Michel (2020) The ideal rate of vaccine absorption during the lifespan is frequently below what is desired. Low vaccine coverage can be attributed to various factors. These include sociodemographic traits, logistical considerations like accessibility and convenience, cultural attitudes like health literacy, and vaccine reluctance. Technology and communication-based strategies, physician-centered approaches, system-based factors, improved vaccine efficacy, and most importantly, political and leadership, are all potential avenues for addressing the factors contributing to low vaccine uptake [28].

Sharma et al. (2018) surveyed the literature on patient engagement strategies for safety in order to assess the present level of evidence. Found 52 publications in 2018 that fulfilled full-text inclusion requirements for synthesis out of 2,795 references. Evidence for patients' active participation in medication and chronic illness self-management, reporting of adverse events, and medical record accuracy was found to be of mixed quality, whereas evidence for patients' self-management of anticoagulant drugs was found to be solid. Anticoagulation management and patient portal access are two promising ways that patients can participate in safety, although they are not commonly used. In order to improve patient involvement in safety initiatives, they go over key implementation priorities and suggest ways forward for study and legislation [29].

Table 2 : Patient Engagement while on Vaccination Uptake and Medication Synchronizations

Authors	Focus Area	Objectives	Approach	Key Findings	Future Work
Gilmore et al. (2022)	Community engagement in health research	To examine and continuously update evidence on community engagement approaches and outcomes	Living systematic review with database searches, grey literature, preprints, and citizen sourcing; screening via Covidence; convergent integrated synthesis	Provides a comprehensive, continuously updated synthesis of community engagement strategies and outcomes across diverse contexts	Quantitative synthesis of primary outcomes where heterogeneity allows; refinement of engagement outcome measures
Merks et al. (2022)	Pharmacist-led vaccination services	To assess patient perceptions of vaccinations administered by pharmacists	Cross-sectional study using an anonymous post-vaccination questionnaire (n = 628)	High patient acceptance; strong perceived convenience and pharmacist competence; high willingness for repeat pharmacist-administered vaccinations	Expansion of pharmacist vaccination services; longitudinal assessment of impact on vaccination coverage
Dutta et al., (2020)	Community engagement in national immunization programs	To understand evolving conceptualizations of community engagement during India's Decade of Vaccines	Qualitative study using semi-structured interviews (n = 25); guided by Schutz's Social Phenomenological Theory and Social Ecological Model	Community engagement is multi-layered, context-specific, and shaped by policy, trust, and social structures	Translation of conceptual frameworks into scalable, community-level implementation strategies
Ecarnot et al. (2020)	Vaccine uptake across the life course	To identify factors contributing to low vaccine coverage and strategies to improve uptake	Narrative review of determinants and intervention strategies	Vaccine uptake influenced by access, health literacy, cultural attitudes, and hesitancy; multifaceted strategies required	Integrated policy-driven and system-level interventions to improve long-term vaccine adherence
Sharma et al. (2018)	Patient engagement in healthcare safety	To evaluate evidence on patient engagement interventions related to safety	Overview of systematic reviews (52 included studies)	Strong evidence for self-management of anticoagulation; mixed evidence for broader medication and chronic disease management	Wider implementation of proven engagement tools; research on scalable patient–provider partnership models
Holt et al. (2016)	Patient voice in vaccination and vaccine safety	To explore the role of patient perspectives in vaccination decision-making	Conceptual and narrative analysis of patient communication and trust	Emphasizes trust-based, two-way communication; patient empowerment is central in post-trust societies	Development of personalized, science-informed communication strategies incorporating patient-reported outcomes

Holt et al. (2016) Patient feedback can be either upbeat or downbeat, simple or intricate. Every person's value system and risk perceptions dictate how they evaluate and handle diverse sources of information. Effective communication in post-trust

society requires more than just a top-down, paternalistic approach, especially when it comes to health authorities. The importance of patient agency and autonomy-promoting healthcare policies is growing. All patients, even those in good health who choose to get immunisations, should have their opinions taken into account and addressed. A parent or guardian's perspective on kids' vaccines is expressed here. Importantly, regulatory bodies are promoting research on clinical and patient-reported outcomes within the context of personalised medicine. The focus of this research is on the recent paradigm shift in vaccination and vaccine safety, which is to give more weight to the opinions of patients [30].

VI. CONCLUSION AND FUTURE WORK

Community pharmacy and patient engagement are essential in increasing the number of patients who take vaccinations, and synchronize their medications or drugs through cognitive, behavioral, and emotional involvement in the healthcare process. A Theory of Planned Behaviour, Patient Activation, and the Health Belief Model Metrics are theoretical frameworks that provide a systematic way to comprehend and promote patient engagement. Individual interventions, education, timely reminders, and community outreach help pharmacists to establish trust, decrease vaccine hesitancy, and promote adherence to chronic medication regimens. Operational preparedness and culturally aware communication, cooperation with medical facilities and local officials are further measures that enhance the results. The fact that global interventions such as COVID-19 vaccination programs have shown that the intention to have a vaccine exceeds its actual acquisition, with an emphasis on the use of context-specific engagement interventions. Overall, patient engagement may enhance preventive care and adherence to medications, yet it may also contribute to strengthening community pharmacies as convenient, reliable and active sources of health promotion in society.

In the future, more sophisticated digital health tools, AI-related prompts, and predictive analytics and their combination could be oriented at maximising patient attention, tailoring interventions, and improving vaccination and medication adherence in various population segments.

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