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RESEARCH ARTICLE

A call to strengthen medication therapy management training in the Kenyan pharmacy undergraduate curriculum: Feedback from a snapshot of the knowledge and practices among pharmacists in diverse disciplines

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Abstract

Background: The role of the pharmacist has continued to evolve, placing the profession at the fulcrum of holistic patient care, including offering medication therapy management (MTM), a critical component of any effective pharmaceutical care plan. **Objective:** This study was conducted to assess the knowledge, attitudes, and practices of Kenyan pharmacists regarding MTM. **Methods:** A cross-sectional study was performed whereby Google Form questionnaires were distributed among pharmacists working at hospitals and community pharmacies between 1st October 2022 and 30th November 2022. **Results:** Slightly over half (62, 52.5%) of the pharmacists rated themselves as knowledgeable about MTM, with most participants (55, 46.6%) stating that the undergraduate pharmacy curriculum was insufficient to prepare one to offer MTM services competently. Notably, online courses and workshops were the most popular channels (72%) for accessing MTM-related continuous professional development among the respondents. **Conclusion:** This study revealed some gaps in the knowledge and competence of undergraduate-level Kenyan pharmacists in their quest to offer MTM services. Therefore, embedding MTM in the undergraduate curriculum can bridge this gap and empower Kenyan pharmacists to provide holistic pharmaceutical care.

Introduction

Medication therapy management (MTM) has emerged as a critical specialised service by pharmacists to optimise therapeutic outcomes (Alshehri *et al*., 2022). Delivering effective MTM services relies on implementing five core pillars embedded within the MTM service (Dhatt *et al*., 2023). Medication therapy review (MTR), where pharmacists gather patient-specific data and evaluate therapy for inconsistencies, is the first aspect of MTM. During MTR, an action plan is developed to address any concerns relating to adverse drug reactions. The second step involves compiling a comprehensive list of prescribed and non-prescribed drugs, dietary supplements, and herbal remedies that the patient may be using (Al-Tameemi & Sarriff, 2019). This enables the establishment of a treatment and monitoring strategy using a personal medication record (PMR) and a medication-related action plan (MAP), the third aspect of MTM (Meng *et al*., 2023). Intervention, sometimes in combination with referral, comprises the fourth aspect of MTM. Where necessary, this is implemented, thereby providing the patient with necessary consultation services. The fifth MTM component involves documentation and subsequent patient follow-up involving the attending physician (McBane *et al*., 2015).

There is an urgent need for prudent utilisation and monitoring of medications as part of patients' pharmaceutical care plans. This is revealed by the widespread inappropriate medication use leading to a myriad of avoidable medication-related problems, such as medication errors and adverse drug events or reactions (Ferreri *et al*., 2020). Collectively, an annual loss of over $42 billion is incurred globally in terms of morbidity and mortality due to medication-related matters (Baraki *et al*., 2018). Patient safety is a particularly pressing issue across the African continent. This is due to the region's fragile healthcare infrastructure and scarce resources to support meaningful, holistic patient care in the face of severe health hazards. The problem is further compounded by other competing basic demands, such as food security and access to elementary education (Mekonnen *et al*., 2018).

While the benefits of MTM are obvious, challenges abound in effectively integrating and implementing the service in pharmaceutical care. A lack of recognition of pharmacists' MTM services by prescribing physicians and patients is a frequent obstacle that limits the reach of the service (Rendrayani *et al*., 2023). Additionally, time constraints have limited the extensive implementation of MTM by pharmacists as they grapple with high client traffic. Moreover, inappropriately designed retail pharmacy settings often lack private space for patient consultations (Lasota *et al*., 2015).

Through appropriate intervention, pharmacists can lessen the burden of complex medication schedules. They can also enhance adherence rates and improve the quality of life for patients while reducing the risk of adverse outcomes and the cost of healthcare (Meng *et al*., 2023). Therefore, it is crucial to create and implement collaborative models between physicians and pharmacists. This approach will help to address medication-related challenges in outpatient settings, especially for patients on multiple medications (Hughes *et al*., 2022). By leveraging their knowledge of medications, pharmacists can help their patients achieve better outcomes (Ferreri *et al*., 2020).

Barriers to effective implementation of MTM are especially evident in low- and middle-income countries. A study done in Malaysia, for example, cited lack of training (88.2%), the high cost of implementing MTM service (51.6%) and lack of time (46.2%) as the main barriers to implementation of MTM services. In Jordan, Jarab *et al*. (2022) identified negative physician attitudes (40.4%), lack of training on MTM provision (38.4%), and lack of adequate support staff (37.2%). In a similar study done among Indonesian pharmacists, a lack of interprofessional collaboration, staff, pharmacist knowledge, patient cooperation, documentation systems, stakeholder support, and patient compliance were the most common barriers to MTM implementation (Rendrayani *et al*., 2023). On the African continent, Nigerian pharmacists have reported a lack of staff, time, adequate training and resources as barriers to the implementation of MTM services (Akonoghrere *et al*., 2020).

Locally, the practice and acceptance of MTM in the Kenyan healthcare system are still low, as reflected by the paucity of MTM studies conducted in the country (Aywak *et al*., 2017). Communication hitches, especially when patients are attended to by multiple healthcare practitioners, have been cited as a hindrance to effective patient care (Dorsey *et al*., 2022). This increases the risk of inappropriate medication use, polypharmacy, and medication-related problems. Therefore, increased implementation of MTM services by pharmacists is necessary and holds the potential to deliver coordinated and efficient pharmaceutical care for optimised treatment outcomes.

In Kenya, pharmacists play a crucial role as accessible healthcare providers, particularly in the outpatient setting where they have frequent and extended patient interactions (Aywak *et al*., 2017). They offer various services, including chronic disease management, collaborating with physicians to optimise patient treatment, and addressing care transition challenges (Mulyanga, 2021). Therefore, integrating MTM services into pharmacy practice in the country is essential. This integration would enhance medication adherence and reduce medication duplication and risk for drug-drug interactions. Moreover, it will lower costs and decrease the reliance on additional medical resources such as emergency services and infrastructure (Al-Tameemi & Sarriff, 2019).

Given the gaps in the status and practice of MTM in the country, this research was carried out to assess the knowledge, attitude, and practices of pharmacists in Kenya towards pharmaceutical care, especially regarding the key components of MTM. Improving the expertise of pharmacists and fostering a positive attitude towards it can bring significant benefits towards better patient health outcomes, reduced healthcare costs, and avert preventable morbidities and mortalities.

Method

Study site, population, and design

The study was conducted in Kenya among pharmacists working in the private retail sector (community

pharmacists) and hospital settings (clinical pharmacists). The study entailed a cross-sectional survey of medication therapy management (MTM) services to determine the knowledge, attitude, and practices of pharmacists regarding MTM. Google Form questionnaires were distributed among pharmacists working at hospitals and community pharmacies during the research period between October 2022 and November 2022.

Selection criteria and sample size determination

The study population included all pharmacists working or interning in a community or hospital pharmacy in Kenya. Expatriate pharmacists working in any of the mentioned sectors were excluded from participating in the study. The Fisher's formula size (Charan & Biswas, 2013), was used to calculate the requisite study sample size. Since the total population of pharmacists in Kenya is less than 10,000, the finite size correction formula was incorporated to obtain a sample size of 160. Participation in the survey was voluntary, and participants were required to provide prior informed consent. Refusal to participate in the study did not lead to any prejudice against those who elected to do so. The names of participants and other identifying information were excluded from the data collection.

Sampling technique

A purposive sampling technique was adopted for this study, whereby the principal researcher distributed the study questionnaire to selected pharmacists, who then shared the invitation with other pharmacists in a snowballing approach. The distribution of the study questionnaire was also facilitated by the Pharmaceutical Society of Kenya, the national professional body for pharmacists in the country.

Data collection technique and data analysis

Data was collected using a self-administered structured questionnaire. The structure and questions of the questionnaire were adopted from validated questionnaires used in two prior similar studies (Al-Tameemi & Sarriff, 2019; Akonoghrere *et al*., 2020). The questions and choices were edited and rephrased where necessary for contextualisation. The online questionnaire, designed using Google Forms, contained three main sections. The first section sought to obtain information on the socio-demographic data and knowledge of pharmacists regarding MTM services. The sociodemographic details included age, gender, number of years in pharmacy practice, and education level.

On the other hand, the knowledge-based questions related to knowledge of MTM and sources of information regarding MTM and its similarities to pharmaceutical care. The second section contained questions aimed at obtaining information on the attitudes of pharmacists towards MTM practice. Specifically, the section posed questions regarding the benefits of the five core elements of MTM. The last section sought to find out the MTM practices, if any, among the pharmacists. Questions in this section included whether the pharmacists offer the MTM service, whether they spend enough time counselling patients, and how much the implementation of MTM costs them. A sample questionnaire is attached in the supporting information. Data analysis was performed using Microsoft Excel 2013 and IBM SPSS Version 28. Categorical variables were expressed using frequencies and percentages.

Ethical considerations

Ethical approval to conduct this study was obtained from the Jomo Kenyatta University of Agriculture and Technology Institutional Ethics Review Committee, with the assigned approval number JKU/ISERC/02316/0776.

Results

Sociodemographic characteristics of respondents

Out of the 118 pharmacists who participated in this study, there were slightly more males (63, 53.4%), those aged 24-30 years (61, 51.7%), and those with zero to five years of professional experience (63, 53.4%). Most participants either had an undergraduate degree only (40, 33.9%), an undergraduate degree with additional professional-related certifications (40, 33.9%) or a master's qualification (37, 31.4%). Pharmacists who obtained an undergraduate degree in Kenya (108, 91.5%) formed the largest proportion, as were those who practised in in-patient-public hospitals (49, 30.6%). Based on geographical location, most respondents were from Nairobi and the Rift Valley region (Table I).

Table I: Sociodemographic characteristics of participating pharmacists

Entry	n	%
Gender		
Male	63	53.4
Female	55	46.6
Age (Years)		
24-30	61	51.7
31-40	47	39.8
41-50	7	5.9
51-60	3	2.5
Professional experience (Years of practice)		
0 - 5 years	63	53.4
5 - 10 years	21	17.8
Over 10 years	34	28.8
Level of academic qualification		
Undergraduate	40	33.9
Undergraduate + certifications	40	33.9
Masters	37	31.4
PhD	1	0.8
Undergraduate pharmacy degree		
Kenyan University	108	91.5
University outside Kenya	10	8.5
Pharmacy practice setting†		
Inpatient-public hospital	49	30.6
Inpatient-private hospital	14	8.8
Outpatient-public hospital	36	22.5
Outpatient-private hospital	12	7.5
Community pharmacy	39	24.4
Management level	4	2.5
Private MTM consultancy	1	0.6
Faith-based organisation	1	0.6
Non-governmental organisation	1	0.6
Health technology firm	1	0.6
Academia	2	1.3
Region of practice		
Central	17	14.4
Coast	11	9.3
Eastern	7	5.9
Nairobi	41	34.7
Northeastern	3	2.5
Nyanza	8	6.8
Rift Valley	24	20.3
Western	7	5.9

†: Total tally for this variable exceeds 118 due to the possibility that a pharmacist worked in multiple sectors.

Knowledge about MTM

Sources of information regarding MTM

Professional colleagues (75, 25.0%), online training (69, 23.0%), and live workshops (65, 21.7%) were the most frequent sources of information on MTM for the pharmacists who took part in the study (Figure 1).

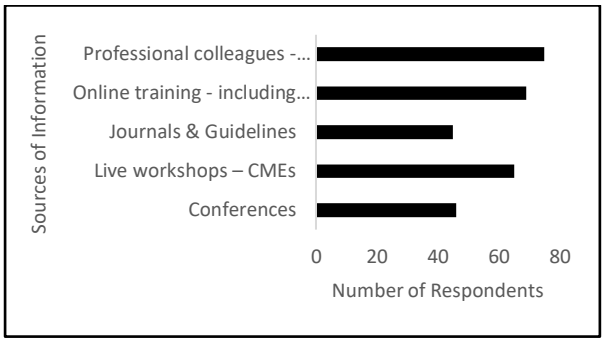

Figure 1: Sources of information on MTM by study participants

Based on their self-evaluation, most pharmacists regarded themselves to be knowledgeable about MTM (62, 52.5%) and pharmaceutical care (82, 69.5%) and agreed that pharmaceutical care and MTM bear similarities (76, 64.4%). However, many (55, 46.6%) disagreed that pharmacy undergraduate training adequately prepares pharmacists to provide MTM services, although they agreed that drug-herb interaction is commonly considered during MTM in local practices (50, 42.4%) (Table II).

Table II: Knowledge of pharmacists regarding MTM services

Statements	n (%)		
	SA + A	Neutral	D + SD
1. I am knowledgeable in MTM	62(52.5)	33(28.0)	23(19.5)
2. I am knowledgeable in pharmaceutical care	82(69.5)	23(19.5)	13(11.0)
3. There are similarities between MTM and pharmaceutical care	76(64.4)	24(20.3)	18(15.3)
4. The pharmacy undergraduate training adequately prepares pharmacists to conduct MTM services.	38(32.2)	25(21.2)	55(46.6)
5. Drug-herb interaction is commonly considered during MTM in local practices	50(42.4)	28(23.7)	40(33.9)

MTM: Medication Therapy Management; SA Strongly Agree; A Agree; D Disagree; SD Strongly Disagree

Notably, most pharmacists who expressed themselves to be knowledgeable in MTM had a higher level of academic qualification, or professional certification, beyond undergraduate training. The years of experience, however, did not affect the level of knowledge of MTM (Table III).

Table III: Knowledge of MTM stratified by level of academic qualification and years of experience

Entry	n (%)		
	SA + A	Neutral	D + SD
Level of academic qualification			
Undergraduate level	16(40.0)	14(35.0)	10(25.0)
Undergraduate + Certifications	25(62.5)	7(17.5)	8(20.0)
Master's and PhD level	21(55.3)	12(31.6)	5(13.2)
Years of experience			
0-5 years	32(50.8)	19(30.2)	12(19.0)
5 – 10 years	10(47.6)	3(14.3)	8(38.1)
More than 10 years	20(58.8)	11(32.4)	3(8.8)

SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

Pharmacists' attitudes towards MTM

Most pharmacists (74.6%) indicated that effective MTM practice required one to know beyond basic pharmacy practice. All MTM core elements, MTR (85.6%), PMR (84.7%), MAP (85.6%), documentation, and follow-up (82.2%), were strongly supported by pharmacists. The same profile was observed regarding the benefits of reviewing a patient's medication profile (89.0%) and intervening in concerning cases (84.7%) in preventing adverse drug reactions. Most study participants (32.2%) also noted that better patient health outcomes can be achieved when a pharmacist monitors a patient's medication compared to other healthcare providers. Furthermore, a similar proportion of pharmacists (32.2%) found providing MTM services to be a unique chance for pharmacists to contribute to holistic patient care (Table IV).

Table IV: Participants' attitude towards MTM

Statements/Questions	n (%)		
	SA + A	Neutral	D + SD
1. **Applying MTM services requires more knowledge than basic information about pharmacy practice**.	88(74.6)	14(11.8)	16(13.6)
2. MTM service is beneficial, considering the five core elements:			
• Medication Therapy Review (MTR)	101(85.6)	7(5.9)	10(8.5)
• Personal Medication Record (PMR)	100(84.7)	5(4.3)	13(11.0)
• Medication-related action plan (MAP)	101(85.6)	7(5.9)	10(8.5)
• Documentation and follow-up	97(82.2)	8(6.8)	13(11.0)
3. To what extent do you agree that the following functions by a pharmacist can prevent adverse drug reactions?			
• Reviewing patient's medication profile.	105(89.0)	4(3.4)	9(7.6)
• Providing interventions to patients whereby the pharmacist acts as a consultant and takes action to resolve any issues with the patient's medications.	100(84.7)	4(3.4)	14(11.9)
4. Compared to other healthcare providers, when a pharmacist monitors a patient's medications, the patient's health outcomes will be enhanced.	101(85.6)	7(5.9)	10(8.5)
5. MTM service provides pharmacists with a unique opportunity to participate in patient care on a broader scale.	104(88.1)	5(4.2)	9(7.6)

MTM: Medication Therapy Management; SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

MTM practices by pharmacists

Table V highlights pharmacists' current practices about MTM and potential impediments to their ability to deploy MTM services in the future. MTM-related online courses (49.2%) and live workshops (72.0%) were identified as effective channels for providing MTM training. Furthermore, most pharmacists (89.8%) were eager to improve their capability to deliver MTM services, and 91.5% attended up to five MTM-related continuing professional development events in the past three months to boost their knowledge and practice. Lack of MTM training (49.2%) was one of the barriers to MTM service implementation. In addition, 59.3% of pharmacies lacked a private counselling area.

Six out of ten (61%) pharmacists stated that they are frequently involved in patient counselling, while another 75.4% believe they will participate in offering MTM services in the future. Most pharmacists agreed that MTM services should be included in community pharmacies (88.1%) and routine pharmaceutical care in hospitals (90.7%). Over half (55.1%) indicated that providing MTM services does not need an expensive budget.

Upon assessment of whether the pharmacists conduct direct patient care, nearly half (47.5%) reported using PMR to communicate and collaborate with other healthcare professionals to achieve optimal patient outcomes. Most study respondents reported using MAP to track their progress towards health goals, with nearly three out of four pharmacists (72.9%) interviewing patients to establish any medication-related problems. Additionally, 61.0% of pharmacists had developed strategies to prevent or correct MRPs, and half of them (50.0%) documented services provided and interventions initiated, including patient follow-up to evaluate progress toward optimum drug therapy goals.

Table V: MTM practices of study participants

Statements/Questions	n (%)		
	SA + A	Neutral	D + SD
1. MTM-related online courses and workshops are an appropriate avenue to provide training for pharmacists.	58(49.2)	26(22.0)	34(28.8)
2. MTM live workshops are preferable in providing training for pharmacists.	85(72.0)	20(16.9)	13(11.0)
3. I participate in continuous professional development training and activities.	74(62.7)	32(27.1)	12(10.2)
4. MTM-related training is one of the potential barriers to applying MTM services in the future.	58(49.2)	26(22.0)	34(28.8)
5. I am interested in learning more information about providing MTM service.	106(89.8)	5(4.3)	7(5.9)
6. I spend a reasonable amount of time counselling patients at my current practice.	72(61.0)	35(29.7)	11(9.3)
7. I believe I will have a reasonable amount of time to offer MTM services in the future.	89(75.4)	21(17.8)	8(6.8)
8. Community pharmacy practitioners should include MTM services as part of their package to advance the impact of the pharmacy profession.	104(88.1)	7(6.0)	7(5.9)
9. MTM services should be incorporated as part of routine pharmaceutical care in the hospital.	107(90.7)	3(2.5)	8(6.8)
10. I was comfortable offering MTM services based on undergraduate qualifications only.	44(37.3)	42(35.6)	32(27.1)
11. Applying MTM services needs an expensive budget	27(22.9)	26(22.0)	65(55.1)
12. I use the Patient Medication Record (PMR) to communicate and collaborate with other healthcare professionals to achieve optimal patient outcomes.	56(47.5)	35(29.6)	27(22.9)
13. I use a Medication-Related Action Plan (MAP) to enable patients to track progress toward health goals	55(46.6)	29(24.6)	34(28.8)
14. I usually ask patients questions to find out if they might be experiencing medication-related problems	86(72.9)	17(14.4)	15(12.7)
15. I design and implement strategies to resolve or prevent medication-related problems	72(61.0)	26(22.1)	20(16.9)
16. I document services and interventions performed in a manner appropriate for evaluating patients' progress	59(50.0)	40(33.9)	19(16.1)
17. I usually follow up with patients to evaluate progress towards drug therapy goals	59(50.0)	35(29.7)	24(20/3)
Questions	**1-5**	**5-10**	**Over 10**
18. How many MTM-related CPD events have you attended in the past three months?	108(91.5)	8(6.8)	2(1.7)
19. In the case that you counsel patients, how much time in minutes do you spend counselling patients?	60(50.8)	40(33.9)	18(15.3)
Questions	**Yes**	**No**	
20. Do you offer MTM service in the facility you are in?	69(58.5)	49(41.5)	
21. Does your pharmacy or workplace currently have a private counselling area?	48(40.7)	70(59.3)	

MTM: Medication Therapy Management; SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

Discussion

Globally, the journey to reaping the benefits of MTM is riddled with contextual challenges. It was due to the scarcity of data on MTM in Kenya, that this study sought to establish the knowledge, attitude, and practices of pharmacists in Kenya regarding MTM. Such data is evidently of inestimable value in characterising the local MTM landscape, identifying the factors affecting current practice and pointing out any existing barriers to effective implementation.

This study revealed that just slightly over half (62, 52.5%) of the pharmacists in Kenya, regardless of the area of specialisation or practice, were knowledgeable in MTM. This is much lower than the proportion of hospital pharmacists in Delta State, Nigeria (94, 94%) (Akonoghrere *et al*., 2020) and Penang, Malaysia (86, 92.5%) (Al-Tameemi & Sarriff, 2019) who declared they know about MTM.

A prior study conducted among community pharmacists in Iowa, USA, found that 90.1% of pharmacists believed MTM services to be an important step in advancing one's pharmacy practice career. A further 86.2% of respondents agreed that using MTM services would provide them with an excellent opportunity to provide better patient care (Jarab *et al.*, 2022). These same attitudes are reflected in the current study, where most pharmacists concurred that pharmacist-led patient medication monitoring would likely result in better patient health outcomes. Also, as observed with a similar study in New York City, USA, most pharmacists favoured the observations of all the five core elements of MTM, finding them to be interrelated and critical in providing improved patient pharmaceutical care outcomes (Shah & Chawla, 2011).

Online courses and live workshops were highlighted as preferred options for transmitting MTM-related knowledge and information. This indicates the vital role that digital technology and platforms play in ensuring continued professional education in the health sector. The flexibility that these modes of interaction provide, coupled with the convenience of accessing the materials later after the course, are important features contributing to their appeal. Moreover, in areas where specialised competencies are still lacking in a certain country or region, engaging a professional colleague or expert based in another country online, as a guest speaker, enables cheaper and more effective knowledge transfer. This option resonates with most of the pharmacists who expressed a great desire to learn more about MTM. Out of these, nearly all had attended at least one course or workshop with professional accreditation, in the last three months.

Designing regular and targeted training on MTM, disseminated via these convenient platforms, can be very beneficial. Specifically, they can be used to address the lack of MTM training which was identified as one of the hurdles to MTM service implementation. Another critical challenge in providing MTM services in pharmacy practice is the absence of a suitable private patient counselling area a resource which approximately 60% of participants in this study agreed to be lacking. In many cases, community pharmacies are small-sized. The bid to maximise space utilisation often ignores incorporating a section where the pharmacist and patient can hold a confidential conversation. It is high time that pharmacists integrated the need for such a crucial space in the design of pharmacies. This will ensure that their premises are adequately aligned to offer holistic pharmaceutical care.

Several other aspects of MTM were applied to varying degrees by study participants. Some 47.5% acknowledged utilising PMR to interact and work with other healthcare providers to achieve optimal patient outcomes. Others used MAP to track their progress toward the attainment of optimum health goals for the patient, an indicator that was less utilised by pharmacists in Nigeria (Akonoghrere *et al*., 2020). Encouragingly, more than half of the pharmacists (72.9%) admitted to asking patients questions to find out if they have medication-related difficulties. A further 61.0% went on to formulate and implement measures to prevent MRPs. However, only half of the pharmacists participated in documentation and patient follow-up to assess progress toward drug therapy goals. This could be a common challenge across the profession. Work-related strains and poor administrative support to enable pharmacists to focus on professional service delivery can be partly remedied by office support in archiving and recording patient data for follow-up.

For the first time, this study highlights the knowledge, attitudes, and practices towards MTM among Kenyan pharmacists practising across disciplines and in different settings. The cross-sectional design of the study was intended to provide a snapshot of the situational analysis. Against this backdrop, further extensive follow-on research can be based to pursue a comprehensive understanding of factors and circumstances facilitating or hindering the uptake and execution of MTM. It was encouraging to observe that most pharmacists have a positive outlook towards offering MTM services. Moreover many were already applying MTM knowledge in their practice to varying degrees, albeit with notable challenges, including time and space constraints.

The clinical implications of these findings are noteworthy. This will be evident when it is borne in mind that the utility of MTM in ensuring optimal pharmaceutical care outcomes is a proven and acknowledged fact. Most of the respondents in this study showed a positive attitude towards offering MTM services. This serves as an impetus for the promotion of MTM services by removing identified barriers to implementation, the key of which is the lack of adequate training on MTM. The result will be the effective use of medicines to achieve treatment outcomes, increased quality of patient care and cost-effective use of medicines.

Limitations

This study was however limited by its cross-sectional design, which confines the findings to the study period. Moreover, potential biases in self-reported data may be present accruing from the fact that data was collected via a self-administered questionnaire. Notably, the purposive sampling technique used in data collection in combination with snowballing limits the generalisability of the findings. Future research aimed at establishing interventions that would be effective in overcoming identified barriers to MTM implementation is recommended. Consequently, the review of pharmacy undergraduate curriculums in Kenya should include MTM training.

Conclusion

In conclusion, this study revealed gaps in the practice of MTM by Kenyan pharmacists, which, if addressed, can extend the frontiers of effective pharmaceutical care. Many participants noted that MTM practice requires more than a basic understanding of pharmacy practice, which is a motivation for the embedding of MTM practice in the undergraduate curriculum and subsequent internship phase before deployment into pharmacy practice. The willingness of the pharmacists surveyed in this study to receive further MTM training and participate in future related research is an encouraging sign that should be harnessed towards MTM implementation across community and hospital pharmacies for optimal patient pharmaceutical care.

Conflict of interest

The authors declare no conflict of interest.

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