Original article

Patterns in counselling services provided at Saudi Ministry of Health medication counselling clinics – Reasons for referrals and subjects discussed: A cross-sectional study

Huda Salhia [a],*, Alaa Mutlaq [a], Abdulrahman Alshaiban [b], Ahmad Alsaleh [a], Rasha Alzahrani [c], Mohammed Alshennawi [a]

[a] *General Administration of Pharmaceutical Care, Ministry of Health, Riyadh, Saudi Arabia*
[b] *King Faisal Medical City for Southern Region, Ministry of Health, Abha, Saudi Arabia*
[c] *Assistant Agency for Hospital Affairs, Ministry of Health, Riyadh, Saudi Arabia*

ARTICLE INFO

ABSTRACT

Background: Pharmacists provide medication counselling services to improve patient knowledge and their adherence to prescription instructions, and to achieve the best possible health-related outcomes. Our study aim was to describe the patterns of the reasons for referral to counselling and the subjects discussed between pharmacists and patients, and the possible associations related to the susceptible patient groups (chronic and elderly), in Saudi Ministry of Health (MOH) medication counselling clinics.
Method: This was a descriptive cross-sectional study. An electronic data collection form was developed to document details about the medication counselling services that were provided to patients. The form consisted of three main areas: (1) patient demographics and counselling services characteristics; (2) reasons for referrals to the medication counselling clinics; and (3) the subjects that were discussed between pharmacists and patients in the counselling session. A comparison was conducted between chronic and non-chronic, and elderly and non-elderly patients.
Results: From May 2020 to December 2021, a total of 36,672 counselling service sessions were provided to 28,998 patients. The greatest proportion of reasons for referrals to counselling was that patients had chronic diseases (50.84%), patients were added a new medication (33.69%) or patients received multiple medications (polypharmacy) (22.71%). The most frequent subject discussed during counselling was general knowledge about medication (85.62%), the duration of therapy (68.42%) and the action that patients should take if they missed a dose of their medication (44.51%). Patients with chronic diseases showed a significantly greater frequency of referral to counselling compared to patients without chronic disease, due to polypharmacy, medication use during Ramadhan, adverse drug reactions (ADRs), dosing/interactions, high-alert medication and suspected nonadherence (P < 0.001). This led to a significantly greater frequency of discussions with patients with chronic conditions about their general medication knowledge, the duration of their therapy, missed doses, ADRs, medication reconciliation and medication use during Ramadhan (P < 0.001). Elderly patients recorded significantly more referrals to counselling related to chronic diseases and polypharmacy than their younger counterparts (P < 0.001); however, there was no significant difference between the elderly and non-elderly in the patterns of subjects discussed that were related to polypharmacy and chronic disease consequences. A significant spike was also reported in the frequency of delivery of counselling services to caregivers for the elderly (P < 0.001).
Conclusion: The current state of medication counselling services in Saudi MOH facilities indicates that chronic disease and polypharmacy are the most significant reasons for referral to counselling, and that

---

* Corresponding author.
E-mail addresses: hsalhia@moh.gov.sa (H. Salhia), asmutlaq@moh.gov.sa (A. Mutlaq), asalshaiban@kfmcity.med.sa (A. Alshaiban), alsaleh@moh.gov.sa (A. Alsaleh), rashama@moh.gov.sa (R. Alzahrani), mshennawi@moh.gov.sa (M. Alshennawi).

Peer review under responsibility of King Saud University.

the subjects discussed the most during counselling are general knowledge about medication, duration of therapy and missed doses. Patients with chronic diseases have a higher frequency of referral to counselling and discussion about polypharmacy and its consequences than those without chronic conditions. Elderly patients also show a high frequency of referral to counselling about chronic diseases and polypharmacy. Caregivers of elderly patients require more education to maximise counselling effectiveness as they attend the majority of elderly patient counselling sessions.

1. Introduction

The need for ongoing quality and safety improvement in patient care continues to grow in all phases of the healthcare process, including pharmaceutical care practice (Wabe et al., 2011). The role of the pharmacist has evolved from that of a dispenser of medication to that of a proactive patient-centric treatment-plan consultant (El-Dahiyat et al., 2018). This has resulted in transforming medication counselling services from patient education about acute medications to consultation about chronic medications, and in increasing the percentage of older patients served (Barnett et al., 2009).

Pharmaceutical service provision must include patient education and counselling regarding medications, medical conditions and other aspects of treatment (Wabe et al., 2011). Patient counselling is defined as face-to-face conversations between pharmacists and patients or caregivers (Blom and Krass, 2011), in which the pharmacist evaluates and consolidates patient understanding of the proper use of prescribed medications, in order to improve adherence and achieve more positive therapeutic and economic outcomes (Palaian et al., 2004, Dalton and Byrne, 2017). The American Society of Health- System Pharmacists (ASHP) recommends four steps to achieve successful medication counselling: (1) establish a caring relationship with the patient; (2) evaluate patient's level of knowledge, attitude, physical ability, and mental capacity; (3) use visual aids in addition to oral information; and (4) verify the patient's understanding (ASHP guidelines on pharmacist-conducted patient education and counselling, 1997).

Various studies have highlighted the importance and impact of medication counselling services on patient care and the economy. Medication therapy management (MTM) studies in the USA have shown that pharmacist interventions result in significant savings in medication expenses, and optimise therapeutic outcomes by improving patient understanding and prescription adherence, and reducing medication complications (Barnett et al., 2009). The impact of pharmacist interventions resulted in medication cost savings of US$3million over 10 years and the improvement of the conditions of 55% of patients (Oliveira et al., 2010). A systematic review conducted in Southeast Asia to evaluate the impact of pharmacist services on economic, clinical and humanistic outcomes (Shrestha et al., 2022). Therapeutic outcomes such as HbA1c level and blood pressure were improved, as were humanistic outcomes such as adherence to prescription instructions, knowledge regarding medication and quality of life (Shrestha et al., 2022). Another systematic review that was performed in Arab country hospitals showed that pharmacist counselling had a positive impact on patients with chronic diseases, patients on polypharmacy, hospitalisation rates, and the number of emergency department visits. It also reported significant improvements in humanistic outcomes and quality of life in patients with heart failure, gestational diabetes and hypertension. Positive economic outcomes were also reported due to pharmacist interventions (>US$7.5 million per year), with reductions in the duration of hospitalisation, and the expenditure on international normalised ratio (INR) testing (El-Awaisi et al., 2022).

Discussions during medication counselling sessions are driven by the pharmacist's evaluation of the patient's knowledge and coun-

selling needs (ASHP guidelines on pharmacist-conducted patient education and counselling, 1997). US MTM studies have shown that the most common drug therapy problems discussed are the need for additional drug therapy and sub-therapeutic dosage (Oliveira et al., 2010). A systematic review study performed in Southeast Asia has found that most pharmacists discuss disease monitoring, treatment optimisation, medication adherence, diet, nutrition and lifestyle during sessions with patients (Shrestha et al., 2022). Another study conducted in Jordan has reported that a majority of counselling discussions there are focused on chronic conditions and weight management (El-Dahiyat et al., 2018). Studies performed in Nigeria and Ethiopia found that most patients required education about the names of their medications, dose, frequency and duration of therapy (Abdu-Aguye et al., 2022; Hirko et al., 2018; Ali et al., 2019).

According to the results of a study conducted in Spain in 2016, about 50% of chronic disease patients do not comply with prescription instructions (Fernandez-Lazaro et al., 2019). Patients with chronic diseases require effective and ongoing medication counselling to understand and implement medication schedules, and to improve their medication adherence (Murray et al., 2007; Taitel et al., 2012; Layqah, 2018). A randomised controlled study conducted on chronic disease patients in South India showed that their medication knowledge and adherence improved significantly with counselling (Ponnusankar et al., 2004). Similarly, a study conducted in Iran showed that pharmacist counselling provided to patients with chronic conditions at the time of discharge and regular follow-up, significantly improved medication adherence and therapeutic outcomes (Sanii et al., 2016). In Saudi Arabia, the Prince Sultan Cardiac Center (PSCC) in Riyadh conducted a study on discharged patients, which indicated that the incidence of medication discrepancy dropped when patients were counselled at discharge (Asiri et al., 2017).

Education and counselling about medication are essential among elderly patients who experience chronic diseases (Marcum et al., 2013; Chew et al., 2021; Alhabib et al., 2022). Chronic disease conditions in the elderly lead to increased use of multiple medications and medication non-adherence (Alhabib et al., 2022). According to a US study, over 40% of elderly patients with chronic cardiovascular disease often fail to follow the instructions for their medication (Marcum et al., 2013). A survey conducted in Singapore reported 60% medication non-adherence among elderly patients who had chronic diseases (Chew et al., 2021), while another survey in Saudi Arabia reported 35% non-adherence among elderly patients with chronic conditions (Alhabib et al., 2022). In parallel, a Saudi national survey that was focused on the prevalence of polypharmacy among Saudi elderly, found that 51.5% of participants were prescribed multiple medications (Aljawadi et al., 2022).

Several regional and global studies have focused on the therapeutic, humanistic and economic impacts of medication counselling services, in addition to the most common subjects discussed during medication counselling (Barnett et al., 2009, Oliveira et al., 2010, Shrestha et al., 2022, El-Awaisi et al., 2022). Previous studies in Saudi Arabia have addressed the quality of the content of counselling delivered, the standard of the counselling pharmacists's skills, and the obstacles that prevent patients

from receiving medication counselling (Alfadl et al., 2018, Alhomoud, 2020, Layqah, 2018). No previous studies from Saudi Arabia have addressed reasons for referral to counselling or the subjects that were discussed during medication counselling. We aimed to conduct the first study that could be used to describe the patterns of reasons for referral to counselling and subjects discussed, and to describe the associations related to susceptible patient groups (chronic and elderly), in Saudi MOH medication counselling clinics.

2. Methods

2.1. Study area and population

The study was conducted on data collected from medication counselling clinics at 127 MOH healthcare facilities across all five geographical regions of Saudi Arabia. The facilities that participated were based at 21 sites: Alahasaa, Albaha, Eastern Province Cluster 1, Central Region Cluster 1, Central Region Cluster 2, Aljouf, Northern Borders, Riyadh, Altaif, Alqurayat, Alqassim, Alqunfudhah, Almadina, Bisha, Tabuk, Jeddah, Hail, Hafr Albaten, Asir, Makkah, and Najran. The study was conducted from May 2020 to December 2021, during which time data was collected for a total of 36,672 counselling service sessions, provided to 28,998 patients. Patient counseling service was provided to paediatric, adult and elderly patients who had visited outpatient clinics in participating MOH hospitals or Primary Healthcare Centers (PHCs), and had been referred to the MOH medication counselling clinic by a physician or pharmacist. The patients selected for referral were patients who had chronic diseases, polypharmacy, issues with the use of medication devices, narrow therapeutic index medications or medications that require therapeutic monitoring, and those with one or more medication adherence problem. Patient counseling service excluded patients who had been admitted to the inpatient department and patients on intravenous medications with day-care follow-up. Our study excluded the data of patients whose records were incomplete.

2.2. Study design

A cross-sectional descriptive study was conducted on patients who had visited outpatient departments in MOH healthcare facilities, and who had received medication counselling services directly or through a caregiver, in a face-to-face or virtual counselling clinic that was managed by pharmacists.

2.3. Ethical considerations

Study approval and ethical clearance were obtained from the Central Institutional Review Board (IRB) of the MOH. The IRB log no. was 22–27 M, dated 19 May 2022. A waiver of informed consent was obtained as no health risk was imposed throughout the process of this study, and patient identities remained confidential.

2.4. Counseling service process

Patients eligible for counseling service were referred by the treating physician or outpatient pharmacist to the medication counseling clinic, as per the service eligibility criteria. According to patient preference, face to face or virtual consultation was scheduled, and the patients received text notifications of their appointments. During each counselling session, the counseling pharmacist reviewed the patient's file which included the patients' medical history, diagnosis, laboratory results, previous medications (including herbal medications) and their most recent medica-

tions. The pharmacist then discussed the medication-related topics with the patient for which they had been referred, and relevant subjects brought up during the session. The pharmacist then documented in the patient's electronic form the reasons for the referral to the counselling session and the subjects that had been discussed with the patient.

2.5. Data collection

An electronic data collection form was developed on which the pharmacist collected the patient's details during the counselling session. The form was reviewed and validated by two experienced clinical pharmacists. The first section of the form concerned patient demographics such as age, gender, residence region and allergies; and the counselling services characteristics such as referral source (physician or pharmacist), type of clinic (face-to-face or virtual), and to whom the information was delivered (patient or caregiver).

The second section addressed the reasons for referral to the medication counselling clinic. The reasons considered in this study were: if patients were taking five or more medications (polypharmacy); if they had problems with medication-related devices; or if they had chronic diseases (e.g., hypertension, diabetes, asthma, etc.). The data collection form also contained several other reasons: if the patient had a new medication added to their treatment plan; if they needed to modify their medication use during Ramadhan; if they were on high alert medication (highly toxic medication, the taking of which must be monitored); if they were exposed to transcription/dispensing error; if they had been prescribed medication with serious ADRs; and if they might experience or had experienced drug-drug or drug-food interactions. Other reasons for referral to counselling considered in the study included patients that were pregnant or lactating who needed full information about their medication; patients that had been prescribed central medication (medication with high cost and high prescription rate); patients that were prescribed narcotic medication; patients who received their medication by pharmacy mail order; or patients that had one or more medication adherence problem.

The third section of the form contained details of the subjects that were discussed with the patient during the session. These included general awareness about the name of the medication/dose/indications/route of administration/frequency; duration of therapy; what the patient should do if they missed a dose; possible ADRs; the safe use of medication during pregnancy/lactation; medication reconciliation; storage of medications; the use of medication during Ramadhan; and advice about ways to maintain a healthy lifestyle.

2.6. Sample size

The total number of MOH healthcare facilities in Saudi Arabia (hospitals and PHCs) that provide outpatient services has been reported to be 2544 (MOH, 2020). On that basis, and through the use of population proportion sample size calculations, we calculated that we had to sample a minimum of 132 healthcare facilities to achieve a 5% error rate with a 95% confidence level. Based on our experience, and in the absence of a clearly documented estimate for population referrals to counseling clinics in Saudi Arabia, we assumed that the expected referral rate from physician clinics or outpatient pharmacies would be at least 80% of the eligible population. Given that all the settings participating in the study have similar capabilities and work conditions, the anticipated number of patients required to be sampled from each setting was determined to be 198. Therefore, a minimum total sample size of 26,136 patients from at least 132 outpatient settings was considered sufficient to comply with our population-based study. An additional 1306 patients (5% of the calculated sample size) were

included to account for possible missing data, to reach a target sample size of 27,442 patients.

2.7. Statistical method

Continuous variables were described as mean ± standard deviation (SD), and categorical variables were presented as numbers with corresponding percentages (n, %). For pairwise comparisons, the Wilcoxon test was performed for continuous non-normally distributed data, and the Chi-square test was implemented for ratios. An a priori alpha level of <0.05 was set for statistical significance. All analysis was performed using SPSS software for Windows (version 26.0, IBM Corp Armonk, NY, USA).

3. Results

3.1. Baseline characteristics

A total of 36,672 counselling services related to medication and/or patient treatment plans were provided to 28,998 patients in 127 healthcare facilities, across 21 sites in Saudi Arabia, during the 20-month study period. Table 1 shows that the majority of services were provided in the central (39.18%) and western (28.90%) regions. Hospitals accounted for 93.44% of patient counselling services, while PHCs accounted for only 6.56%. Around two-thirds of the services (64.55%) were conducted face-to-face, while 35.45% were conducted virtually. Of the 36,672 pharmacist-patient encounters, 55.33% involved female patients and 44.67% male patients. The age group that received the highest number of services was 50 to 64 years (28.36%), while the elderly population (65 + years) received 18.29% of the services. The source of referral

Table 1
Baseline characteristics of participants in medication counselling clinics.

Characteristic	Total N = 36,672(n, (%))
Region	
Central	14,368 (39.18%)
Eastern	6,364 (17.35%)
Northern	1,752 (4.78%)
Southern	3,590 (9.79%)
Western	10,598 (28.90%)
Setting	
Hospital	34,266 (93.44%)
PHC	2,406 (6.56%)
Type of clinic	
Face-to-face	23,671 (64.55%)
Virtual	13,001 (35.45%)
Age group (yrs)	
<5	589 (1.61%)
5–19	2,384 (6.50%)
20–34	7,741 (21.11%)
35–49	8,848 (24.13%)
50–64	10,401 (28.36%)
65–80	5,338 (14.56%)
> 80	1,371 (3.74%)
Source of referral	
Pharmacy (Outpatient)	28,022 (76.41%)
Physician clinic	8,650 (23.59%)
Receiver of counselling	
Caregiver	7,224 (19.70%)
Patient	26,267 (71.63%)
Patient/caregiver	3,181 (8.67%)
Gender of counselled patient	
Female	20,292 (55.33%)
Male	16,380 (44.67%)
Counselling delivered to elderly[1]/non-elderly	
Elderly	6,709 (18.29%)
Non-elderly	29,963 (81.71%)

[1] Aged 65 years or older.

for around three quarters of the counselling services provided (76.41%) was the outpatient pharmacist, while one quarter (23.59%) were referred by treating physician. The majority of counselling services were delivered directly to the patient (71.63%), while 19.70% were delivered to a caregiver, and delivery to patient and caregiver together was in 8.67% of encounters.

3.2. Reasons for referral to counselling

Table 2 identifies all reasons for referral to counselling that were recorded per encounter in our study. Around half of the encounters occurred in response to referrals due to chronic disease (50.84%). A third of the reasons were the addition of new medication (33.69%), while one-fifth of the reasons were related to polypharmacy (22.71%) and medication device use (21.88%). ADR was the reason in 17.23% of the encounters, while medication received by mail order and high-alert medications constituted 14.36% and 12.72% of the reasons respectively. Less than 10% of encounters were about dosing/interactions (8.33%), central medications (6.63%), medication use during the month of Ramadhan (5.64%), pregnancy/lactation (5.13%), suspected non-adherence (5.05%), dispensing/transcription errors (4.12%), or narcotics (1.57%). The mean number of reasons for referral to counselling was 2.22 ± 1.54 per encounter.

3.3. Subjects discussed

Table 3 summarises the multiple subjects that were discussed between the pharmacist and the patient per encounter, during single counselling sessions. Most of the encounters involved discussions of patients' general knowledge regarding the medication name/dose/indication/route/frequency (85.62%) and the duration of therapy (68.42%). Less than half of the sessions included discussions related to missed doses (44.51%), ADRs (40.99%) or medication storage (39.69%). One-third of the sessions reported discussions related to lifestyle (32.90%), and medication reconciliation (29.41%). The fewest subjects discussed were pregnancy/lactation (11.69%) and the use of medication during the month of Ramadhan (3.32%). In 14.74% of the sessions, it was reported that the patient was not interested in the discussion. The mean number of subjects discussed per encounter was 3.71 ± 2.39.

Table 2
Reasons for referral to counselling in medication counselling clinics.

Reason	Total N = 36,672 (n, (%))
Polypharmacy	8,328 (22.71%)
Medication device	8,023 (21.88%)
Medication use during the month of Ramadhan	2,067 (5.64%)
Dispensing/transcription error	1,512 (4.12%)
ADRs	6,319 (17.23%)
Chronic disease	18,643 (50.84%)
New medication	12,355 (33.69%)
Pregnancy/lactation	1,881 (5.13%)
Central medication	2,430 (6.63%)
Narcotic medication	577 (1.57%)
Medications received via mail order	5,265 (14.36%)
Dosing/interactions inquiry	3,056 (8.33%)
Suspected nonadherence	1,852 (5.05%)
High-alert medication	4,663 (12.72%)
Number of reasons for referral to counselling per encounter	
Mean (SD)	2.22 (1.54)

Table 3
Subjects discussed in medication counselling clinics.

Subject discussed	Total N = 36,672(n, (%))
Name of medication/dose/indication/route/frequency	31,397 (85.62%)
Duration of therapy	25,090 (68.42%)
Actions taken if dose is missed	16,322 (44.51%)
ADRs	15,033 (40.99%)
Pregnancy/lactation	4,288 (11.69%)
Medication reconciliation	10,784 (29.41%)
Medication storage	14,554 (39.69%)
Lifestyle modification	12,066 (32.90%)
Patient unwilling to discuss any information	5,404 (14.74%)
Medication use during the month of Ramadhan	1,186 (3.23%)
Number of subjects discussed per encounter	
Mean (SD)	3.71 (2.39)

3.4. Patients with chronic disease

Table 4 shows an overall comparison between the patterns of counselling services that were provided to patients with chronic disease versus those with non-chronic conditions. Half of the encounters involved chronic disease cases. The mean number of reasons for referral to counselling per session was 2.97 ± 1.56 for chronic cases versus 1.45 ± 1.07 for non-chronic; the mean number of subjects discussed with the patient per session was 4.37 ± 2.33 in the chronic cases versus 3.02 ± 2.25 in the non-chronic, with a statistically significant difference between the two groups (P < 0.001). The number of patients with chronic versus non-chronic diseases who received counselling showed a statistically significant difference in counselling service rates according to geographical region (P < 0.001). Patients with chronic disease who lived in the southern and western regions registered higher frequencies of counselling compared with non-chronic cases (10.34% vs. 9.22% and 32.55% vs. 25.12% respectively). Patients with chronic conditions who received counselling in PHCs were given advice more frequently than those with non-chronic conditions (9.23% vs. 3.80%, P < 0.001). There was a statistically significant difference in counselling frequency between chronic and non-chronic cases with respect to age (P < 0.001); elderly patients (aged 65 years or older) received counselling more often in chronic cases (21.85% vs. 14.62%). Who received the counselling was also statistically significantly different between chronic and non-chronic cases (P < 0.001). Patients and caregivers together received counselling more often in chronic cases compared to non-chronic (10.78% vs. 6.50%). There was no significant difference in counselling rates by type of clinic, gender or source of referral (P = 0.100, P = 0.952 and P = 0.232 respectively).

All the types of reasons for referral to counselling recorded statistically significant differences in counselling rates between chronic and non-chronic patients (P < 0.001). Polypharmacy recorded the most significant difference among chronic compared with non-chronic patients (29.15% vs. 16.05%). The rate of referral to counselling about medication use during Ramadhan among those with chronic diseases was twice that observed among those with non-chronic conditions (7.51% vs. 3.70%). Chronic disease patients were referred significantly more for counselling about ADRs than patients with non-chronic conditions (20.94% vs.13.40%), as was the case for referrals about dosing/interactions (10.74% vs. 5.58%). Counselling regarding high alert medications registered three times the rate of referral among chronic disease patients over that among non-chronic (18.84% vs. 6.38%), and cases of suspected non-adherence were referred over four times as much among patients with chronic diseases compared to those with non-chronic conditions (8.20% vs. 1.80%).

Similarly, all discussion subjects were discussed more often with patients who had chronic rather than non-chronic diseases, except for pregnancy/lactation, and there was a statistically significant difference between the numbers of subjects discussed (P < 0.001). Pharmacists discussed more often with chronic patients their knowledge of medication names/doses/indications/routes/frequency of administration than they did with non-chronic patients (92.65% vs. 78.34%). Duration of therapy and missed doses were also discussed more often with patients with chronic diseases compared to those who had no chronic conditions (76.52% vs. 60.04% and 55.04% vs. 33.61% respectively). ADRs (50.06% vs. 31.62%), medication reconciliation (37.40% vs. 21.14%), and medication storage (49.17% vs. 29.88%) all recorded higher discussion rates with patients who had chronic diseases than with non-chronic patients. Discussions about lifestyle occurred almost three times as often with chronic disease patients (47.64% vs. 17.66%), while discussions about medication use during Ramadhan were held more than twice as often with those with chronic conditions compared with those with non-chronic conditions (4.43% vs. 2.00%). There was no significant difference between the chronic disease and non-chronic disease patients, in the frequency of discussions with those who were not willing to discuss any information (P = 0.502).

3.5. Elderly patients

Table 5 shows a comparison of the patterns in counselling services that are provided to elderly patients versus those who are not elderly. Our study showed that 18.29% of all encounters recorded were for elderly patients. The mean of the number of reasons for referral to counselling per encounter was 2.44 ± 1.59 for elderly patients and 2.17 ± 1.53 for non-elderly (P < 0.001), while the mean number of subjects discussed showed no significant difference between elderly and non-elderly patients (P = 0.757). There was a statistically significant difference in the rates of counselling services that were offered to elderly and non-elderly patients according to geographical region (P < 0.001). Elderly patients who lived in the southern region were counselled more often than non-elderly (13.53% vs. 8.95%), and likewise, those who lived in the western region (33.37% vs. 27.90%). The receiver of the counselling also recorded a statistically significant difference (P < 0.001); caregivers received the counselling more than twice as often in cases in which they cared for an elderly patient compared with when they cared for a non-elderly patient (37.90% vs. 15.62%). Gender recorded a statistically significant difference between elderly and non-elderly patients (P < 0.001). Elderly males received counselling more often than did non-elderly males (50.34% vs. 43.40%), while elderly females received counselling less often than their younger counterparts (49.66% vs. 56.60%).

Overall, regarding most of the reasons for referral to counselling, more elderly patients received counselling than did younger patients, and these differences were statistically significant. This was not the case with regard to ADRs, or central or narcotic medications (P = 0.063, P = 0.847 and P = 0.555 respectively). Polypharmacy showed the most significant difference regarding the frequency of referral to counselling among elderly patients compared with non-elderly (30.26% vs. 21.02%, P < 0.001), and the rate of referral to counselling about chronic disease was also significantly more frequent in the elderly than the non-elderly patients (60.76% vs. 48.62%, P < 0.001). In contrast to reasons for referral to counselling, there was no significant difference in the patterns of subjects discussed between elderly and non-elderly patients, except for discussions about lifestyle modification (34.68% vs. 32.50%, P < 0.001) and the likelihood that patients would be unwilling to discuss any information (16.50% vs. 14.34%, P < 0.001).

Table 4
Comparison of patterns of counselling services offered in medication counseling clinics between patients with chronic conditions and those with non-chronic conditions.

Characteristic	Chronic diseases, N = 18,643 (n, (%))	Non-chronic diseases, N = 18,0291 (n, (%))	*P*-value[1]
Region			**<0.001**
Central	6,768 (36.30%)	7,600 (42.15%)	
Eastern	3,225 (17.30%)	3,139 (17.41%)	
Northern	653 (3.50%)	1,099 (6.10%)	
Southern	1,928 (10.34%)	1,662 (9.22%)	
Western	6,069 (32.55%)	4,529 (25.12%)	
Setting			**<0.001**
Hospital	16,922 (90.77%)	17,344 (96.20%)	
PHC	1,721 (9.23%)	685 (3.80%)	
Type of clinic			0.100
Face-to-face	12,109 (64.95%)	11,562 (64.13%)	
Virtual	6,534 (35.05%)	6,467 (35.87%)	
Age group (yrs)			**<0.001**
<5	186 (1.00%)	403 (2.24%)	
5–19	1,047 (5.62%)	1,337 (7.42%)	
20–34	3,175 (17.03%)	4,566 (25.33%)	
35–49	4,191 (22.48%)	4,657 (25.83%)	
50–64	5,970 (32.02%)	4,431 (24.58%)	
65–80	3,223 (17.29%)	2,115 (11.73%)	
> 80	851 (4.56%)	520 (2.88%)	
Receiver of counselling			**<0.001**
Caregiver	3,502 (18.78%)	3,722 (20.64%)	
Patient	13,131 (70.43%)	13,136 (72.86%)	
Patient/caregiver	2,010 (10.78%)	1,171 (6.50%)	
Gender of counselled patient			0.952
Female	10,313 (55.32%)	9,979 (55.35%)	
Male	8,330 (44.68%)	8,050 (44.65%)	
Reason for counselling			
Polypharmacy	5,435 (29.15%)	2,893 (16.05%)	**<0.001**
Medication device	4,501 (24.14%)	3,522 (19.54%)	**<0.001**
Medication use in Ramadhan	1,400 (7.51%)	667 (3.70%)	**<0.001**
Dispensing/transcription error	989 (5.30%)	523 (2.90%)	**<0.001**
ADRs	3,903 (20.94%)	2,416 (13.40%)	**<0.001**
New medication	5,327 (28.57%)	7,028 (38.98%)	**<0.001**
Pregnancy/lactation	428 (2.30%)	1,453 (8.06%)	**<0.001**
Central medication	1,754 (9.41%)	676 (3.75%)	**<0.001**
Narcotic medication	328 (1.76%)	249 (1.38%)	**0.004**
Medications received via mail order	3,308 (17.74%)	1,957 (10.85%)	**<0.001**
Dosing/interactions inquiry	2,002 (10.74%)	1,054 (5.85%)	**<0.001**
Suspected nonadherence	1,528 (8.20%)	324 (1.80%)	**<0.001**
High alert medication	3,513 (18.84%)	1,150 (6.38%)	**<0.001**
Number of reasons for referral per encounter			**<0.001**
Mean (SD)	2.97 (1.56)	1.45 (1.07)	
Subject discussed			
Medication name/dose/indication/route/frequency	17,273 (92.65%)	14,124 (78.34%)	**<0.001**
Duration of therapy	14,265 (76.52%)	10,825 (60.04%)	**<0.001**
Actions taken if dose is missed	10,262 (55.04%)	6,060 (33.61%)	**<0.001**
ADRs	9,332 (50.06%)	5,701 (31.62%)	**<0.001**
Pregnancy/lactation	1,822 (9.77%)	2,466 (13.68%)	**<0.001**
Medication reconciliation	6,973 (37.40%)	3,811 (21.14%)	**<0.001**
Medication storage	9,167 (49.17%)	5,387 (29.88%)	**<0.001**
Lifestyle modification	8,882 (47.64%)	3,184 (17.66%)	**<0.001**
Patient not willing to discuss any information	2,770 (14.86%)	2,634 (14.61%)	0.502
Medication use in Ramadhan	826 (4.43%)	360 (2.00%)	**<0.001**
Number of subjects discussed per encounter			**<0.001**
Mean (SD)	4.37 (2.33)	3.02 (2.25)	
Source of referral			0.232
Pharmacy (Outpatient)	14,197 (76.15%)	13,825 (76.68%)	
Physician clinic	4,446 (23.85%)	4,204 (23.32%)	
Counselling delivered to elderly[2]/non-elderly			**<0.001**
Elderly	4,074 (21.85%)	2,635 (14.62%)	
Non-elderly	14,569 (78.15%)	15,394 (85.38%)	

[1] Pearson's Chi-squared test; Wilcoxon rank sum test.
[2] Aged 65 years or older.

4. Discussion

This study has provided a baseline description of the current state of medication counselling clinic services in the Saudi MOH. It highlighted the reasons that lead to the most referrals to a medication counselling clinic, the subjects that are discussed the most during medication counselling, and the susceptible patient groups (chronic and elderly patients) for which medication counselling services are most essential. During this study, a total of 36,672 medication counselling sessions (or encounters) were provided to 28,998 patients across 21 sites that were run by the Saudi MOH.

Table 5
Comparison of patterns in medication counselling services in elderly vs. non-elderly.

Characteristic	Elderly, N = 6,709 (n, (%))	Non-elderly, N = 29,963 (n, (%))	*P*-value[1]
Region			**<0.001**
Central	2,453 (36.56%)	11,915 (39.77%)	
Eastern	929 (13.85%)	5,435 (18.14%)	
Northern	180 (2.68%)	1,572 (5.25%)	
Southern	908 (13.53%)	2,682 (8.95%)	
Western	2,239 (33.37%)	8,359 (27.90%)	
Setting			0.451
Hospital	6,255 (93.23%)	28,011 (93.49%)	
PHC	454 (6.77%)	1,952 (6.51%)	
Type of clinic			**<0.001**
Face-to-face	4,177 (62.26%)	19,494 (65.06%)	
Virtual	2,532 (37.74%)	10,469 (34.94%)	
Age group (yrs)			**<0.001**
<5	0 (0.00%)	589 (1.97%)	
5–19	0 (0.00%)	2,384 (7.96%)	
20–34	0 (0.00%)	7,741 (25.84%)	
35–49	0 (0.00%)	8,848 (29.53%)	
50–64	0 (0.00%)	10,401 (34.71%)	
65–80	5,338 (79.56%)	0 (0.00%)	
> 80	1,371 (20.44%)	0 (0.00%)	
Receiver of counselling			**<0.001**
Caregiver	2,543 (37.90%)	4,681 (15.62%)	
Patient	3,307 (49.29%)	22,960 (76.63%)	
Patient/caregiver	859 (12.80%)	2,322 (7.75%)	
Gender of counselled patient			**<0.001**
Female	3,332 (49.66%)	16,960 (56.60%)	
Male	3,377 (50.34%)	13,003 (43.40%)	
Reason for counselling			
Polypharmacy	2,030 (30.26%)	6,298 (21.02%)	**<0.001**
Medication device	1,542 (22.98%)	6,481 (21.63%)	**0.015**
Medication during Ramadhan	412 (6.14%)	1,655 (5.52%)	**0.047**
Dispensing/transcription error	315 (4.70%)	1,197 (3.99%)	**0.009**
ADRs	1,208 (18.01%)	5,111 (17.06%)	0.063
Chronic disease	4,074 (60.72%)	14,569 (48.62%)	**<0.001**
New medication	1,959 (29.20%)	10,396 (34.70%)	**<0.001**
Pregnancy/lactation	267 (3.98%)	1,614 (5.39%)	**<0.001**
Central medication	441 (6.57%)	1,989 (6.64%)	0.847
Narcotic medication	111 (1.65%)	466 (1.56%)	0.555
Medications received via mail order	1,074 (16.01%)	4,191 (13.99%)	**<0.001**
Dosing/interactions inquiry	611 (9.11%)	2,445 (8.16%)	**0.011**
Suspected nonadherence	400 (5.96%)	1,452 (4.85%)	**<0.001**
High alert medication	1,012 (15.08%)	3,651 (12.19%)	**<0.001**
Number of reasons for referral per encounter			**<0.001**
Mean (SD)	2.44 (1.59)	2.17 (1.53)	
Subject discussed			
Medication name/dose/indication/route/frequency	5,793 (86.35%)	25,604 (85.45%)	0.059
Duration of therapy	4,547 (67.77%)	20,543 (68.56%)	0.210
Actions taken if dose is missed	2,915 (43.45%)	13,407 (44.75%)	0.053
ADRs	2,689 (40.08%)	12,344 (41.20%)	0.093
Pregnancy/lactation	579 (8.63%)	3,709 (12.38%)	**<0.001**
Medication reconciliation	1,940 (28.92%)	8,844 (29.52%)	0.330
Medication storage	2,670 (39.80%)	11,884 (39.66%)	0.838
Lifestyle modification	2,327 (34.68%)	9,739 (32.50%)	**<0.001**
Patient unwilling to discuss any information	1,107 (16.50%)	4,297 (14.34%)	**<0.001**
Medication use during Ramadhan	228 (3.40%)	958 (3.20%)	0.400
Number of subjects discussed per encounter			0.757
Mean (SD)	3.69 (2.35)	3.71 (2.40)	
Source of referral			0.937
Pharmacy (Outpatient)	5,129 (76.45%)	22,893 (76.40%)	
Physician clinic	1,580 (23.55%)	7,070 (23.60%)	

[1] Pearson's Chi-squared test; Wilcoxon rank sum test.

The general pattern of our results revealed that the greatest rate of referral to counselling was for chronic disease (50.84%). This result was higher than that found in a seven-year study from the USA published in 2009, which considered 23,798 patients and reported a counselling rate of 37.9% for chronic disease patients (Barnett et al., 2009). This difference might be due to the time that has elapsed since that date and changes in prevalence of diseases, since the prevalence of chronic disease among US adults today is estimated at 60% (Centers for Disease Prevention and Control, 2022). On the other hand, our study result for this rate is lower than that reported in a study from Jordan, which showed a 72.5% prevalence of counselling for chronic conditions (El-Dahiyat et al., 2018). This could be because the study in Jordan was conducted in community pharmacies, which are more accessible to patients. The second most common reason for referral to counselling found in our study was the addition of new medication to the treatment plan (33.69%). This finding is relatively consistent with that of a 10-year US study, which registered that 28.1% of

patients needed additional new medication in their treatment plans (Oliveira et al., 2010). A study in Saudi Arabia that was conducted at the PSCC in Riyadh found that the addition of new medication was a reason for counselling in 48% of encounters (Asiri et al., 2017). This higher figure could be due to the difference in healthcare setting, as the PSCC is a single specialist hospital, and its results might be overestimated. Polypharmacy was the third most cited reason for counselling in our study (22.71%). This finding was in line with our study finding that chronic disease was the most common reason for counselling. The association between chronic disease and polypharmacy was evident in a study conducted on elderly outpatient visitors to PHCs in Qatar in 2017, which reported that the prevalence of polypharmacy among elderly patients who suffered from chronic diseases was estimated at 75.5% (Al-Dahshan et al., 2020). This difference could be attributed to the nature of patients who visit PHCs, since they may have multiple conditions.

With regard to the subjects discussed between pharmacists and their patients during medication counselling sessions, our study found that medication knowledge (85.62%) was the most frequent subject discussed. This is consistent with the findings from a study conducted in Ethiopia, which reported that over 90% of patients needed general medication advice (Ali et al., 2019). Our study showed that duration of therapy (68.42%) was the second most frequent subject of discussion, which is in agreement with a study from Nigeria that reported that more than 60% of patients could not identify how long they should continue with their medication (Abdu-Aguye et al., 2022). Missed doses (44.51%) formed our third most common subject. The figure we recorded was lower than the corresponding findings from another study in Ethiopia, which found that 71.3% of discussions were about missed doses (Hirko et al., 2018). A possible explanation for this difference could be that the data in Ethiopia was collected by exit interview from a government hospital, which could subject results to recall bias, and lead to underestimation of the knowledge measurement.

Our analysis revealed greater need for referral to medication counselling services in susceptible populations such as patients with chronic disease or who are elderly. In the chronic disease population, our study found that the mean of the number of reasons for referral to counselling was significantly higher than the corresponding number in the non-chronic population (2.97 ± 1.56 vs. 1.45 ± 1.07). It is recognised that patients with chronic diseases are at high risk of multiple morbidity, which leads to high prevalence of polypharmacy and non-adherence (Alhabib et al., 2022; Aljawadi et al., 2022). In line with the above, chronic disease patients in our study showed a statistically significant greater frequency with respect to reasons for referral to counselling in all the counselling reasons addressed. Polypharmacy was the highest recorded reason for referral to counselling among chronically ill patients compared with non-chronic (29.15% vs. 16.05%). This figure for those with chronic conditions was not as high as those found in two studies in Saudi Arabia, which reported 89% and 78% prevalence of polypharmacy among chronically ill patients respectively (Salih et al., 2013; Alwhaibi et al., 2018). The reason for this difference could be that the above two studies were conducted in tertiary hospitals. However, our polypharmacy results were consistent with our study findings about the need for referral to counselling among those with chronic diseases about multiple medication use during Ramadhan. Referrals for this subject were made at double the frequency that they were made for non-chronically ill patients (7.51% vs. 3.70%). In our study, those with chronic diseases also showed significantly higher counselling referral rates regarding ADRs (20.94% vs. 13.40%), dosing / interactions (10.74% vs. 5.58%) and high-alert medications (18.84% vs. 6.38%) than did those with non-chronic conditions. Moreover, suspected non-adherence led to more than four times the number of

referrals (8.20% vs. 1.80%) in chronic compared with non-chronic patients. This was in line with the findings of a study conducted on Saudi outpatients who had type 2 diabetes, which recorded 65% non-adherence among those with chronic disease (AlQarni et al., 2019), and a study from Jordan which showed that patient non-adherence to medication instructions was a concern for 88% of pharmacists (El-Dahiyat et al., 2018).

Our results also indicated that the mean number of subjects discussed per counselling session among those with chronic disease was significantly higher than the corresponding number among those with non-chronic conditions (4.37 ± 2.33 vs. 3.02 ± 2.25). In this study, the observed high demand for counselling services among patients with chronic disease led to a significantly higher number of subjects being discussed with the pharmacist during counselling. Patient knowledge about the medication's name/dose/indication/route/frequency was discussed more often with chronic patients than non-chronic (92.65% vs. 78.34%). Duration of therapy (76.52% vs. 60.04%) and missed doses (55.04% vs. 33.61%) were also discussed more often in chronic cases. Our study also revealed that discussions about ADRs (50.06% vs. 31.62%) and medication reconciliation (37.4% vs. 21.14%) occurred more frequently among chronic than non-chronic patients. These findings about frequency of discussions about ADRs were higher than those of a study in Ethiopia, which found that less than a third of patients received counselling about ADRs (Ali et al., 2019). This difference could be because data were collected from the outpatient pharmacy in one specialised hospital, and the results cannot be generalised to the entire population. Similar to the pattern in the above-mentioned discussion subjects, discussions about medication use during the month of Ramadhan also occurred more frequently with people with chronic disease compared with those with non-chronic conditions (4.43% vs. 2.00 %).

In the elderly population, we found that the mean number of reasons for referral to counselling was significantly higher than the non-elderly (2.44 ± 1.59 vs. 2.17 ± 1.53). According to our findings, elderly patients are generally more likely to be referred to counselling clinics than younger groups for various reasons, but are less likely to have discussions with pharmacists. This is in agreement with the study conducted in Riyadh at two tertiary hospitals, which indicated that there was an inversely proportional relationship between patient age and the desire to attend pharmacist counselling sessions (Layqah, 2018). With regard to delivery of counselling, our study recorded a significant spike in the frequency of delivery to a caregiver for elderly over non-elderly patients (37.90% vs. 15.62%, P < 0.001), and likewise for delivery to patient and caregiver together (12.80% vs. 7.75%, P < 0.001). Our study also found a significantly higher rate of referral to counselling about chronic conditions among elderly versus non-elderly patients (60.72% vs. 48.62%). This finding is consistent with those of a study that highlighted the substantially high prevalence of chronic disease among the elderly in Saudi Arabia (Saquib et al., 2017). Referrals due to polypharmacy were also made more often among the elderly than the younger groups (30.26% vs. 21.02%), which is consistent with the high prevalence of chronic disease in elderly patients (Saquib et al., 2017). This figure regarding referrals for polypharmacy was lower than the 51.5% prevalence reported in a previous study from Saudi Arabia, which could be due to the different definition of elderly age that was used in that study (≥60 years old) (Aljawadi et al., 2022).

In our study, discussions about lifestyle showed a slightly higher prevalence in the elderly (34.68% vs. 32.50%, P < 0.001). This is inconsistent with the finding of a previous study conducted in 15 PHCs in Riyadh, which showed that over 80% of counselling discussions with the elderly were about lifestyle (Alhamdan et al., 2015). This discrepancy could be due to the difference in the study settings, or perhaps to the more intimate relationship between

patients and healthcare providers in PHCs than in hospitals. Unwillingness to discuss any information (16.5% vs. 14.34%, P < 0.001) also occurred more often in the elderly. This finding is similar to the result from a study conducted by counselling pharmacists at King Abdulaziz Medical City in Riyadh, which showed that lack of patient intertest was a barrier to the provision of counselling for 16.7% of patients (Albekairy, 2014). Despite the significantly high prevalence of reasons for referral to counselling that were related to chronic disease and polypharmacy among the elderly patients in our study, we found no significant difference in the frequency of any discussions related to either of the above reasons. This might be because counselling services for the elderly in our study were delivered mainly through the caregiver. This is in line with the previous study, which concluded that delivery via a caregiver was a major counselling barrier (Albekairy, 2014). It is also in line with the findings of a recent study in Taiwan about the effect of caregiver counselling on medication persistence and adherence, which found no significant effect of caregiver intervention on treatment outcomes (Huang et al., 2020).

Our study is the first to provide a baseline description of the patterns in medication counselling services provided in Saudi Arabia. The strength of our study lies in its large sample size, nationwide scope and population-based study, which give reliability to our findings. One limitation of our study was that the data collection period coincided with the occurrence of the COVID-19 pandemic, which may have affected patient behavior and attitude towards utilisation of counselling services. Another limitation was that the implementation of medication counselling clinic services was in its initial phase for PHCs at the time of data collection, which may have been a factor in the low participation rate from PHCs. Also, adherence in our study was measured subjectively by asking patients questions; no reliable tool was used to measure adherence. In addition, due to daily workload, some pharmacists may write down the details of the counseling discussion during the session, then log in at the end of the day and record the information in the electronic form, which may cause some inaccuracy during transfer of information. The results might need to be interpreted with caution due to the statistical sensitivity that may result from our large sample size.

Future research in Saudi Arabia should be focused on the clinical, humanistic and economic outcomes of medication counselling. Another potential research opportunity is the investigation of the state of patient counselling services in PHCs under the MOH. Education and counselling programmes should be developed to address the most significant patterns identified in this study of reasons for referral and subjects discussed in Saudi MOH medication counselling clinics. These programs should focus on medication counselling related to chronic diseases and polypharmacy and its consequences, in the elderly and chronic disease patients. Awareness programs should be customized to target caregivers, especially those who deal with the elderly and chronic disease patients. It is also essential to raise awareness among patients, especially the elderly, about the importance of benefitting from counselling session discussions.

5. Conclusion

Chronic disease and polypharmacy are the most significant reasons for referral to counselling in medication counselling clinics in the Saudi MOH. The subjects discussed the most between pharmacists and patients are general knowledge about medication, the duration of therapy and missed doses. Patients with chronic diseases have a high frequency of referral to counselling and discussions about polypharmacy and its consequences. The most important pattern among elderly patients versus non-elderly is

the higher rate of referral to counselling about chronic diseases and polypharmacy. However, our study showed no difference in the frequency of discussions about chronic disease and polypharmacy between pharmacists and elderly or non-elderly patients. Caregivers attend the majority of elderly patient counselling sessions, which suggests the need to maximise caregiver education to improve counselling effectiveness.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authorship contribution statement

Huda Salhia: Data analysis Data interpretation and findings Statistical report writing Conceptualization Manuscript writing Manuscript revision and finalization Abstract writing Project administration. **Alaa Mutlaq:** Methodology writing Data interpretation and findings Manuscript revision. **Abdulrahman Alshaiban:** Literature review Introduction writing Data analysis Manuscript revision. **Ahmad Alsaleh:** Data collection Literature review Introduction writing. **Rasha Alzahrani:** Literature review Methodology writing Manuscript revision. **Mohammed Alshennawi:** Manuscript revision Manuscript editing.

References

Abdu-Aguye, S.N., Labaran, K.S., Danjuma, N.M., Mohammed, S., 2022. An exploratory study of outpatient medication knowledge and satisfaction with medication counselling at selected hospital pharmacies in Northwestern Nigeria. PLoS One 17, e0266723.

Albekairy, A.M., 2014. Pharmacists' Perceived Barriers to Patient Counselling. J. Appl. Pharm. Sci. 4, 70–73. https://doi.org/10.7324/JAPS.2014.40112.

Al-Dahshan, A., Al-Kubiasi, N., Al-Zaidan, M., Saeed, W., Kehyayan, V., Bougmiza, I., 2020. Prevalence of polypharmacy and the association with non-communicable diseases in Qatari elderly patients attending primary healthcare centers: A cross-sectional study. PLoS One 15, e0234386.

Alfadl, A.A., Alrasheedy, A.A., Alhassun, M.S., 2018. Evaluation of medication counselling practice at community pharmacies in Qassim region, Saudi Arabia. Saudi Pharm. J. 26, 258–262. https://doi.org/10.1016/j.jsps.2017.12.002.

Alhabib, M.Y., Alhazmi, T.S., Alsaad, S.M., AlQahtani, A.S., Alnafisah, A.A., 2022. Medication Adherence Among Geriatric Patients with Chronic Diseases in Riyadh, Saudi Arabia. Patient Prefer. Adherence 16, 2021–2030. https://doi.org/10.2147/PPA.S363082.

Alhamdan, A.A., Alshammari, S.A., Al-Amoud, M.M., Hameed, T.A., Al-Muammar, M. N., Bindawas, S.M., Al-Orf, S.M., Mohamed, A.G., Al-Ghamdi, E.A., Calder, P.C., 2015. Evaluation of health care services provided for older adults in primary health care centers and its internal environment. Saudi Med. J. 36, 1091–1096. https://doi.org/10.15537/smj.2015.9.11789.

Alhomoud, F.K., 2020. Act like a warrior to defeat medication counselling barriers: A cross sectional study. Saudi Pharm. J. 28, 1084–1092. https://doi.org/10.1016/j.jsps.2020.07.009.

Ali, S., Shimels, T., Bilal, A.I., 2019. Assessment of Patient Counselling on Dispensing of Medicines in Outpatient Pharmacy of Tikur-Anbessa Specialized Hospital, Ethiopia. Ethiop. J. Health Sci. 29, 727–736. https://doi.org/10.4314/ejhs.v29i6.9.

Aljawadi, M., Khoja, A., Alaboud, N., Alenazi, M., Alshammari, S., Khoja, T., AlMuqbil, M., Alsheikh, A., Alwhaibi, M., 2022. Prevalence of Polypharmacy and Factors Associated with it Among Saudi Older Adults – Results from the Saudi National Survey for Elderly Health (SNSEH). Saudi Pharm. J. 30. https://doi.org/10.1016/j.jsps.2022.01.003.

AlQarni, K., AlQarni, E.A., Naqvi, A.A., AlShayban, D.M., Ghori, S.A., Haseeb, A., Raafat, M., Jamshed, S., 2019. Assessment of Medication Adherence in Saudi Patients With Type II Diabetes Mellitus in Khobar City, Saudi Arabia. Front. Pharmacol. 10, 1306. https://doi.org/10.3389/fphar.2019.01306.

Alwhaibi, M., Balkhi, B., Alhawassi, T.M., Alkofide, H., Alduhaim, N., Alabdulali, R., Drweesh, H., Sambamoorthi, U., 2018. Polypharmacy among patients with diabetes: a cross-sectional retrospective study in a tertiary hospital in Saudi Arabia. BMJ Open 8, e020852.

ASHP guidelines on pharmacist-conducted patient education and counselling, 1997. Am. J. Health-Syst. Pharm. 54, 431–434. https://doi.org/10.1093/ajhp/54.4.431.

Asiri, T., Khurshid, F., Almutairi, M., Alhusayyen, M., Alkharji, F., Alsultan, M., 2017. Impact of pharmacist intervention in patient counselling at point of hospital discharge in a specialized cardiac center in Saudi Arabia. Trop. J. Pharm. Res. 16, 1187. https://doi.org/10.4314/tjpr.v16i5.29.

Barnett, M., Frank, J., Wehring, H., Newland, B., VonMuenster, S., Kumbera, P., Halterman, T., Perry, P., 2009. Analysis of Pharmacist-Provided Medication Therapy Management (MTM) Services in Community Pharmacies Over 7 Years. J. Managed Care Pharm.: JMCP 15, 18–31. https://doi.org/10.18553/jmcp.2009.15.1.18.

Blom, L., Krass, I., 2011. Introduction: The role of pharmacy in patient education and counselling. Patient Educ. Couns. 83, 285–287. https://doi.org/10.1016/j.pec.2011.05.021.

Centers for Disease Prevention and Control, 2022. Chronic Diseases in America [Web document]. URL https://www.cdc.gov/chronicdisease/resources/infographic-chronic-diseases.htm (accessed 18 September 2022).

Chew, S.M., Lee, J.H., Lim, S.F., Liew, M.J., Xu, Y., Towle, R.M., 2021. Prevalence and predictors of medication non-adherence among older community-dwelling people with chronic disease in Singapore. J. Adv. Nurs. 77, 4069–4080. https://doi.org/10.1111/jan.14913.

Dalton, K., Byrne, S., 2017. Role of the pharmacist in reducing healthcare costs: current insights. Integr. Pharm. Res. Pract. 6, 37–46. https://doi.org/10.2147/IPRP.S108047.

El-Awaisi, A., Al-Shaibi, S., Al-Ansari, R., Naseralallah, L., Awaisu, A., 2022.. A systematic review on the impact of pharmacist-provided services on patients' health outcomes in Arab countries. J. Clin. Pharm. Therap. https://doi.org/10.1111/jcpt.13633.

El-Dahiyat, F., Curley, L., Babar, Z.-U.-D., 2018. A survey study to measure the practice of patient counselling and other community pharmacy services in Jordan. J. Pharm. Health Serv. Res. 10. https://doi.org/10.1111/jphs.12272.

Fernandez-Lazaro, C.I., García-González, J.M., Adams, D.P., Fernandez-Lazaro, D., Mielgo-Ayuso, J., Caballero-Garcia, A., Moreno Racionero, F., Córdova, A., Miron-Canelo, J.A., 2019. Adherence to treatment and related factors among patients with chronic conditions in primary care: a cross-sectional study. BMC Fam. Pract. 20, 132. https://doi.org/10.1186/s12875-019-1019-3.

Hirko, N., Edessa, D., Sisay, M., 2018. Exit-Knowledge of Ambulatory Patients About Medications Dispensed in Government Hospital in Eastern Ethiopia: The Need for Focused Patient Counselling. Front. Public Health 6, 254. https://doi.org/10.3389/fpubh.2018.00254.

Huang, C.-Y., Hu, C.-J., Huang, L.-K., Chang, E.H., 2020. Effects of caregiver counselling on medication persistence and adherence in patients with dementia at a pharmacist-managed clinic: A pilot study. J. Clin. Pharm. Therap. https://doi.org/10.1111/jcpt.13752.

Layqah, L., 2018. The practice of counselling in pharmacy: patients' perspectives. JAPLR 7. https://doi.org/10.15406/japlr.2018.07.00269.

Marcum, Z.A., Zheng, Y., Perera, S., Strotmeyer, E., Newman, A.B., Simonsick, E.M., Shorr, R.I., Bauer, D.C., Donohue, J.M., Hanlon, J.T., 2013. Prevalence and Correlates of Self-Reported Medication Non-Adherence among Older Adults with Coronary Heart Disease, Diabetes Mellitus, and/or Hypertension. Res. Social Adm. Pharm. 9. https://doi.org/10.1016/j.sapharm.2012.12.002.

Ministry Of Health Saudi Arabia, 2020. Statistical Year Book 2020 [web document]. URL https://www.moh.gov.sa/en/Pages/Default.aspx (accessed 7 March 2022).

Murray, M.D., Young, J., Hoke, S., Tu, W., Weiner, M., Morrow, D., Stroupe, K.T., Wu, J., Clark, D., Smith, F., Gradus-Pizlo, I., Weinberger, M., Brater, D.C., 2007. Pharmacist Intervention to Improve Medication Adherence in Heart Failure: A Randomized Trial. Ann. Intern. Med. 146, 714. https://doi.org/10.7326/0003-4819-146-10-200705150-00005.

Oliveira, D., Brummel, A., Miller, D., 2010. Medication Therapy Management: 10 Years of Experience in a Large Integrated Health Care System. J. Managed Care Pharm.: JMCP 16, 185–195. https://doi.org/10.18553/jmcp.2010.16.3.185.

Palaian, S., Chhetri, A.K., Prabhu, M., Rajan, S., Shankar, P.R., 2004. Role Of Pharmacist In Counselling Diabetes Patients. Internet J. Pharmacol. 4 https://ispub.com/IJPHARM/4/1/3272.

Ponnusankar, S., Surulivelrajan, M., Anandamoorthy, N., Suresh, B., 2004. Assessment of impact of medication counselling on patients' medication knowledge and compliance in an outpatient clinic in South India. Patient Educ. Couns. 54, 55–60. https://doi.org/10.1016/S0738-3991(03)00193-9.

Salih, S.B., Yousuf, M., Durihim, H., Almodaimegh, H., Tamim, H., 2013. Prevalence and associated factors of polypharmacy among adult Saudi medical outpatients at a tertiary care center. J. Family Community Med. 20, 162–167. https://doi.org/10.4103/2230-8229.121987.

Sanii, Y., Torkamandi, H., Gholami, K., Hadavand, N., Javadi, M., 2016. Role of pharmacist counselling in pharmacotherapy quality improvement. J. Res. Pharmacy Pract. 5, 132. https://doi.org/10.4103/2279-042X.179580.

Saquib, N., Saquib, J., Alhadlag, A., Albakour, M.A., Aljumah, B., Sughayyir, M., Alhomidan, Z., Alminderej, O., Aljaser, M., Al-Mazrou, A., 2017. Chronic disease prevalence among elderly Saudi men. Int. J. Health Sci. (Qassim) 11, 11–16 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5669504.

Shrestha, S., Shrestha, R., Ahmed, A., Sapkota, B., Khatiwada, A.P., Christopher, C.M., Thapa, P., KC, B., Blebil, A.Q., Khanal, S., Paudyal, V., 2022. Impact of pharmacist services on economic, clinical, and humanistic outcome (ECHO) of South Asian patients: a systematic review. J. Pharm. Policy Pract. 15, 37. https://doi.org/10.1186/s40545-022-00431-1.

Taitel, M., Jiang, J., Rudkin, K., Ewing, S., Duncan, I., 2012. The impact of pharmacist face-to-face counselling to improve medication adherence among patients initiating statin therapy. Patient Prefer. Adherence 6, 323–329. https://doi.org/10.2147/PPA.S29353.

Wabe, N.T., Raju, N.J., Angamo, M.T., 2011. Knowledge, attitude and practice of patient medication counselling among drug dispensers in North West Ethiopia. Journal of Applied Pharmaceutical. Science 6 https://japsonline.com/admin/php/uploads/178_pdf.pdf.