

Original Research Article

Adherence level and medication beliefs among care homes residents in Klang Valley

Hasnah Ismail, Wan Uswah Hasanah Wan Azmi, Mathumalar Loganathan, Ezlina Usir*

Department of Pharmacy Practice, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM), 42300 Bandar Puncak Alam, Selangor, Malaysia.

Abstract

Medication adherence is a growing problem in a healthcare system especially among elderly. Elderly are often associated with co-morbidities that exposed them to poly-pharmacy, this eventually leads to poor adherence to medication. Medication beliefs have influenced the way the patients perceive the effectiveness of the medications and its negative outcomes. It is projected to be a strong predictor of medication non-adherence among patients. The objectives of this study were to investigate the level of medication adherence and the relationship between medication adherence and medication beliefs among elderly residing in care homes. The study was a cross-sectional study involving elderly aged 65 years and above, currently taking at least one medication for chronic illness and have stayed for at least one year in the care homes. Twenty-seven care homes in Klang Valley involving 258 respondents were involved in this study. A validated questionnaire consisted of demographic data of respondents, Belief about Medicine Questionnaire, and Medication Safety Alert Tool for Elderly (MeSATE) were utilized. More than half (59.7%) of the elderly were identified as having a low risk to medication non-adherence. Statistically significant correlations were reported in specific concern ($r = 0.273$, $p < 0.001$), general harm ($r = 0.327$, $p < 0.001$) and general overuse ($r = 0.134$, $p = 0.032$) where it was positively correlated with higher risk of medication non-adherence. In conclusion, specific-concern, general-harm, and general-overuse on medication beliefs strongly predict the adherence level to medication.

Keywords: Medication adherence, medication beliefs, elderly, care homes

****Corresponding author***

*Ezlina Usir
Level 11, FF1 Building, Faculty of Pharmacy,
UiTM Puncak Alam, Bandar Puncak Alam, 42300,
Selangor, Malaysia
ezlin365@uitm.edu.my*

Received 22 Dec 2020; accepted 30 March 2021

Available online: 13 April 2021

1.0 Introduction

The world's elderly population has been rising in both developed and developing countries. By 2050, it is estimated that the population of those aged 60 years and above will increase to 2.1 billion from 962 million in 2017 (1). This population is also expected to be higher than children under the age of 14 years (2,3). In Malaysia, as of July 2020, the number of elderly is 2.3 million or 7% of the total population (4) and is projected to increase to more than 6.0 million by 2040 (5). Elderly is known as the person who is 65 years and over (6). With the growing number of elderly, demand for health care and care homes have increased significantly (7). Elderly people who are sickly or with physical morbidity may require a proper care from another person (8). In developed countries, 2-5% of elderly and up to 25% of those 85 years or older were admitted to care homes (9). In 2014, it was reported that, there were ten elderly who were sent to long-term care facilities every week in Malaysia (10). As of 2018, there were 1,838 senior citizens resided in registered care centres in Selangor and WP Kuala Lumpur (11) This indicated more family passing their responsibility of taking care of their parents to the care homes (10). Elderly who had concerns about side effects and doubt the need of medication had a higher risk of non-adherence (12). As elderly are often associated with multiple comorbidities, they become more prone to polypharmacy hence, leading to greater medication adherence problems (6).

According to the World Health Organization (WHO), drug adherence is defined as "the extent to which a person's behaviour on taking medication, following a diet, and/or executing lifestyle changes corresponds with the agreed recommendations from a health care provider" (13). Medication adherence is important to ensure the patients get optimum

therapeutic benefits from the medications. The term non-adherence describes the poor adherence to medication and it is an increasing problem in the healthcare system (13). Non-adherence to medication has associated with worsening the diseases, increased health care cost and death (14). Non-adherence is further classified into unintentional and intentional non-adherences. Unintentional non-adherence is when the persons do not take the medication as prescribed due to factors beyond their control, whereas intentional non-adherence occurs as the patients make deliberate decisions of not following the prescribed medication regimen (14,16).

Adherence to medication can be influenced by a multitude of factors including patient factors, disease factors, medication factors, socioeconomic factors and psychosocial factors (6,17). Beliefs about medication which is a part of psychosocial factor show a greater contribution to patient's adherence behavior (18). As according to psychosocial theories, patients' behavior and belief about medication have influenced medication adherence that includes the perception towards illness, believed on the effectiveness of medication, the perception of the side effects related to the medication and perception on over-prescription by the physician (14,19).

Medication non-adherence has become a growing problem among elderly who are often prescribed with a number of medications (6,19). Negative beliefs about medication such as perception of lack of benefits and increasing problems from medication-taking has increased the risk of medication non-adherence, thus result in decreasing therapeutic outcome, worsening health and high hospitalization rates (18). Polypharmacy in elderly may potentially lead to inappropriate prescribing which may results in adverse drug events and hospitalization (20).

The expanding population of elderly has increased the needs for care homes, however there were very few published articles on adherence towards medications among community-dwelling elderly including those in care homes (7,21). Some studies in Malaysia involved hospital settings and were not specifically using elderly as samples (22, 23, 24). A study in Klang Valley reported inappropriateness of medications in nursing homes (25) while another study in Kuala Lumpur tested the utilization of mobile app in improving medication adherence (26). A study in long term care facilities in Malaysia involving 18 years and above resident reported that beliefs toward medication was strongly associated with their adherence level and concluded that there was a need to review and revamp the current medication management in these facilities (27).

The objectives of this study were to i) determine medication adherence level among care home residents and ii) evaluate the relationship between medication adherence level and medication beliefs among elderly living in care homes.

Non-adherence will lead to a decrease in therapeutic outcomes and increase in the cost of the treatment. Hence, to ensure the efficacy of medical treatment regimens and gain a more positive health outcome, it is important for the patient to adhere to their prescribed medication (28). This can help care homes reduce the burden of managing the health care of the elderly such as reducing hospital and physician visit (7,28). Furthermore, the information collected in this research will assist the health care provider to develop a strategy to improve the level of medication adherence in an elderly population in the future.

2.0 Materials and methods

This was a cross-sectional study among elderly population living in care homes using

a validated questionnaire. There were 211 care homes in Klang Valley listed in an extensive internet search using the terms ‘care homes’, ‘nursing homes’, ‘old folks’ homes’, ‘rumah jagaan orang tua’ and pusat jagaan orang tua’. These care homes were contacted, and intention and study procedures were explained to the manager through phone call. Once agreed, an email with further details was sent to the person-in-charge and an appointment was set for the interview.

The inclusion criteria include those aged more than 65 years old, taking at least one medication for chronic illness and have stayed in the care homes for at least a year. Elderly with mental disorder, not responsive and do not understand either Malay or English language were excluded.

2.1 Instrument

The research instrument involved in this study consists of data collection form, Beliefs about Medicine Questionnaire (BMQ) (29) and Medication Safety Alert Tool for Elderly (MeSATE) (30), used to assess medication adherence level among elderly in the care homes. Questionnaire was bilingual, in English and Malay language.

a. Data collection form

Respondents’ demographic data includes gender, age, marital status, race, source of income and duration of staying in the care home.

b. Beliefs about Medicine Questionnaire (BMQ)

Beliefs about Medicine Questionnaire (BMQ) was taken from previous study and contains 18 items on specific and general beliefs to medications (29). Specific section measured patients’ beliefs about prescribed medication for particular diseases. It comprised of two scales which are specific

necessity and specific concern (19). The general section described general beliefs about medicine and was divided into general overuse and general harm scales (29).

BMQ was scored with 5 points Likert scale ranging from 1 to 5 representing strongly disagree to strongly agree (31). The scale scores were obtained by calculating the mean scores of corresponding items (29). Higher mean scores represent stronger beliefs in the concept of each scale. For specific necessity, the higher scores present a greater belief in the necessity for medication whilst higher scores for specific concern show increase concern on taking medication (32). Higher scores on general overuse indicate a negative view about the way the medicine was prescribed. For general harm, higher scores describe patients' negative views on medicines for example medicines are harmful (32).

c. Medication Safety Alert Tool for Elderly (MeSATE)

MeSATE was used to evaluate the adherence level to medication for elderly and it consists of 17 items that has four domains which were disease factors, treatment factors, socioeconomic factors and psychosocial factors (30). The choices are based on a Likert scale with options of yes, no and not applicable. For disease, treatment and socioeconomic factors, each items contributed to 5% of the adherence level whereas for psychosocial factor, each items contributed for 10% of the adherence level. The respondents are at risk of medication-related adherence is determined by the percentage of each domain contributed which can be classified into low, moderate and high risk. The respondents are at high risk of non-adherence if the percentage is 80% or above, moderate risk (40% to 79%) and low risk (< 40%) (30). Approval to use this questionnaire was obtained from the developer.

A pilot study was conducted on 30 respondents. The Cronbach's alpha coefficient value was 0.711. These results were excluded in the final results.

2.2 Study design

The research was conducted using face-to-face interviewer-administered questionnaire. Informed consent was obtained from the subject or carer prior to the interview. Respondents can refuse to answer any items and withdraw at any time during the interview. All responses were treated with strictest confidentiality and only be made available to the researchers. Information were immediately transcribed to the questionnaire. The interview took about 20 minutes per respondent. Ethics approval was obtained from UiTM ethics committee (REC UiTM) reference number: REC/242/19.

2.3 Data analysis

Data collected from the study was entered and analyzed by using IBM SPSS (Statistical Package for Social Science) software version 25. Descriptive statistics was used to analyze demographic data of respondents that were presented as percentage and frequency. Chi-square test was carried out to measure the relationship between the demographic profile and medication adherence level. Pearson correlation coefficient was also used to assess the relationship between medication adherence and medication belief. To evaluate the impact of medication beliefs on medication adherence level, multiple linear regression was conducted. The results are considered significant if p-value is less than 0.05.

3.0 Results

3.1 Socio-demographic characteristics

Twenty-seven care homes from both government and nongovernmental organization were involved in the studies with a total of 258 respondents. The mean age of the respondents was 76.5; SD=7.44, more than half of the respondents were female (66.3%), Chinese (80.6%), married (39.5%), received support in terms of income from their family (70.2%), had educational background until secondary level (40.3%), stayed in the long-term care facilities from one to five years, (82.6%) and prescribed with equal or more than 5 medications. (35.7%,) as in Table 1.

Table 2 showed that majority of the elderly have a low risk to medication non-adherence (59.7%) and about two-fifth (40.0%) of them have a moderate risk to medication non-adherence.

3.2 Medication adherence and demographic characteristics of the elderly

There was no statistically significant difference between demographic characteristics and level of medication adherence.

3.3 Medication beliefs

The scores for specific-necessity scale that describe the patients need of prescribed medication varies between 8 to 25, corresponding to a mean of 19.94 (SD= 3.178). For specific-concern scale that assess patients' concern on the harmful effects upon consuming the medication, the scores ranged between 5 to 20, corresponds to a mean of 10.63 (SD=3.891). The general-overuse scale, that consists of statement related to excessive usage of medicine, the value ranged from 4 to 19, with the mean of 9.05 (SD= 3.029). For general-harm scale which

evaluates the beliefs about medicine as harmful, the score obtained was between 4 to 14, corresponding to a mean of 7.04 (SD= 4.000) as shown in Table 3.

Table 1: Sociodemographic characteristic of respondents, (n=258)

Variables	Frequency	Percent (%)
Gender		
Male	87	33.7
Female	171	66.3
Age group (76.5±7.44)		
65-74	112	43.4
75-84	104	40.3
85-94	42	16.3
Ethic group		
Malay	13	5
Chinese	208	80.6
Indian	36	14
Other	1	0.4
Marital status		
Not married	74	28.7
Married	102	39.5
Divorced / Widowed	82	31.8
Source of income		
None	29	11.2
Allowance	6	2.3
Family support	181	70.2
Insurance	8	3.1
Pension	34	13.2
Education Level		
None	62	24
Primary	62	24
Secondary	104	40.3
Tertiary	30	11.6
Length of stay		
1-5 years	213	82.6
More than 5 years	45	17.4
No of current medications		
Less than 5	166	64.3
5 or more	92	35.7
Types of care homes		
Nursing home	188	72.9
Residential home	70	27.1

Table 2: Medication non-adherence risk among elderly, (n=258)

Risk	Frequency, n	Percent, %
Low risk	154	59.7
Moderate risk	103	40.0
High risk	1	0.4

MeSATE Score: Low risk (less than 40%); Moderate risk (40-80%); High risk (above 80%)

Table 3: Medication belief scores, (n=258)

Scale	Range	Mean (SD)	Stronger belief (%)	Weaker belief (%)
Specific- necessity	8-25	19.91 (3.178)	95.0	5
Specific -concern	5-20	10.63 (3.891)	18.2	81.8
General - overuse	4-19	9.05 (3.029)	3.1	96.9
General - harm	4-14	7.04 (4.000)	0	100.0

The scores for each scales were then dichotomized in the midpoint, which is 15 to indicate stronger beliefs or weaker beliefs.

Table 3 showed the response towards BMQ. For specific-necessity scale, 95% (n=245) have stronger beliefs while 5% (n=13) have weaker beliefs on the need to take medication. For specific-concern scale, 81.8% (n=211) of elderly has weaker beliefs and concern about dangers of toxicity of consuming medication; general-overuse, most elderly (n=250, 96.9%) has weaker belief; general-harm scale, all elderly (n=258, 100%) has weaker belief about the harmful and risk of dependence from taking medicines.

3.3.1 Medication beliefs and demographic data of elderly

The Pearson Chi-Square was used to evaluate the relationship between medication belief with demographic data of elderly. There was a statistically significant correlation between specific-necessity scale and ethnic group of the elderly (p=0.023). Ethnic group (p=0.048) and source of income (p=0.015) showed significant associations

with general-harm scale. For specific-concern and general-overuse, it was not statistically significant (Table 4).

3.3.2 Medication belief and medication adherence among elderly

To assess the correlation between two continuous variables which are medication adherence and medication belief, Pearson correlation coefficient was used. The relationship between medication adherence and belief about medicine scale was shown in Table 5. Statistically significant correlations were reported in specific concern (r = 0.273, p<0.001), general harm (r = 0.327, p<0.001) and general-overuse (r = 0.134, p = 0.032) where it was positively correlated with higher risk of medication non-adherence. There was no statistically significant correlation between adherence to medication and specific-necessity scale.

3.3.3 The impact of medication belief on medication adherence

Standard regression was conducted to analyse the effect of medication belief on

Table 4: Relationship between belief about medicine scale and demographic data, (n=258)

Scale	Gender	Age	Ethnic group	Marital status	Source of income	Education level	Length of stay	Number of medication
Specific-necessity	0.711	0.719	0.023*	0.112	0.316	0.633	0.696	0.445
Specific-concern	0.959	0.956	0.321	0.301	0.097	0.701	0.420	0.914
General-overuse	0.322	0.212	0.320	0.537	0.394	0.201	0.416	0.668
General-harm	0.671	0.143	0.048*	0.088	0.015*	0.182	0.659	0.948

Table 5: Correlation and impact of belief about medicine on medication adherence, (n=258)

Variable	Correlation, r, (p value)	Standardize coefficients Beta	t (p value)
Adjusted R Square = 0.110			
Constant			2.280 (p = 0.023)
Specific-necessity	0.018 (p = 0.770)	-	-
Specific-concern	0.273** (p < 0.001)	0.170	2.521 (p = 0.012)
General-overuse	0.134* (p = 0.032)	0.034	0.553 (p = 0.581)
General-harm	0.327** (p < 0.001)	0.243	3.576 (p < 0.001)

*Pearson correlation is significant at the 0.05 level (2-tailed).

**Pearson correlation is significant at the 0.01 level (2-tailed).

medication adherence. Specific-necessity was removed from the analysis as it has no correlation with medication adherence. Table 5 showed the impact of specific-concern, general-overused and general-harm on medication adherence. The adjusted R Square was 0.110. The specific-concern (p = 0.012) and general-harm (p < 0.001) were statistically significantly associated with medication adherence. There was no statistically significant relationship exists for general-overused and medication adherence. The items on specific-concern and general-harm was analysed and was later established that "Having to take medication worries me" on specific-concern scale highly determine medication adherence behaviour (p=0.034).

4.0 Discussion

4.1 Socio-demographic characteristics

In this study, there were higher percentage of female elderly compared to male elderly, possibly due to the longer life expectancy of female in Malaysia (33). In addition, female population also seeks health care more often than men (34). In this study, a majority of them age ranged from 65 to 74 years old., consistent with previous study conducted on older people in primary care setting (34). More Chinese elderly resided in care homes compared to Malay and Indian elderly and a majority was financially supported by their families. Possible reasons are continuing changes in intergenerational relationships among modern Asian society, children staying further away with some

work environment forcing the children to send their parent at a private care home as there are no caregiver to look after their parents and the institutional can offer a better care for their parents (10).

Most of the elderly are literate as they finished primary, secondary and tertiary level of education. This finding contradicted with previous report profiles in care setting in Brazil where elderly has low levels of education (34). However, in this study, a quarter of them (24%) were illiterate as they could not go to school and this may be associated with low medication adherence and poor health outcome (35, 36). In this study, more than one-third of the elderly took more than five medicines for chronic illness suggesting that elderly often faced multiple medical conditions such as cardiovascular disease, endocrine disorder and central nervous system disorder and thus are prescribed with more medicines (17,37).

4.2 Medication adherence level

A majority of elderly have low risk to medication non-adherence, this is probably because the elderly mostly reside in nursing care settings and caregivers are normally involved during the medication administration process. This ensure residents took all the required medications (28,38). Similarly, a 2016 study in Malaysia reported high adherence rates, however the sample was not exclusively for those 65 years and above (27). Most care homes also kept the residents' medication with the help of compliance kits such as pill box. Two-fifth of elderly have moderate risk and only had high risk to medication non-adherence possibly due to care home do not provide on-site nursing care to fully monitor their adherence to medication (39).

4.3 Medication adherence and demographic data of elderly

In this study there were no significant correlations between medication adherence with the demographic data, however a study in Singapore and Portugal reported that male has poorer medication adherence to female and aging increase the risk of non-adherence to medication (6,13). A previous study in Malaysia reported that hypertensive patients of the Chinese ethnic group has higher medication adherence than Indian patients (40). A study from Palestine found that married respondents often have higher adherence to medication compared to others, although this association then disappear in multiple regression analysis (31). As the elderly are prone to have co-morbidities they are likely to consume more medications hence, increase the risk for non-adherence to medications, as reported in India (17). However another study found that the total number of medications did not determine medication adherence (31).

4.4 Medication beliefs

In this study, majority of the elderly has stronger beliefs in specific-necessity scale. Beliefs in the necessity to consume the prescribed medicine is often related to perceptions of illness. In Germany, a study reported that as elderly believed that their illness last a long time and experienced more symptoms, they tend to have stronger beliefs about the importance of taking medications as prescribed (41).

This study showed that most of the elderly has weaker beliefs in specific-concern, general-overuse and general-harm scales. However, Thorneleo et al in 2018 found that elderly have stronger belief in over-prescription of medicine by doctors and they should use less medicine and do not place too much trust on medicine (16). A stronger concern about prescribed medicine made them cautious to consume the medicine and prefer more information about the

medicine (29,41). As for general-harm scale, all elderly have weaker beliefs about the harmful effects and risk of dependence from medicine. This is possibly because they were less aware of the harmful and adverse effect of medicines (19).

4.4.1 Medication beliefs and demographic data of elderly

There was a significant relationship between specific-necessity with ethnic group. However, most of the elderly involved in this study are Chinese and therefore the result is may not represent the general population. Studies by Geboers et al. in Netherlands and Fischer et al. in Germany also reported that belief about the necessity to consume medication as prescribed has no relation with ethnic group instead it was influenced by the patients perception of disease (36,41). Statistically significant correlations also exist between general-harm with ethnic group and source of income. This finding contradicted studies in Palestine and Portugal where the concern about harmful effect of medicine are independent to ethnic group and source of income (31,42).

4.4.2 Medication beliefs and medication adherence

In this study, there were no correlation between specific-necessity scale and medication adherence. This finding contradicted a previous study that reported patient has lower risk of non-adherence to medication when they have stronger belief about the importance of taking medication to treat disease. Beliefs about the necessity to consume the prescribed medication are often associated with perceptions of diseases. The patients have a stronger belief in the necessity to consume the medication as they perceived their disease last a long time and experienced more symptoms (29,41). There was a

significant positive relationship between specific-concern with medication adherence. These findings are consistent with a previous review in a clinical setting in Sweden where a strong relationship exist between concern about the adverse effects of medications with medication non-adherence (19). When the patients have less concern and less distrust about the prescribed medication, they will likely to adhere to medication thus reducing the risk of medication non-adherence as reported by Fischer et al. in Germany (41).

General-overuse also shows a significant positive correlation with medication adherence. Weaker beliefs about the medications in general-overuse by doctors, will increase the patients level of medication adherence. For patients which have stronger belief that medications are overused and overprescribed by the doctors, they tend to lean towards seeking other alternative method to treat their disease (14,41). This study also depicts a significant association between general-harm with medication adherence. This result of this study is similar with studies in Sweden and Germany where patients reported greater adherence to medication when they have lower perception that medications are harmful and associated with risk of dependence (19,41).

4.4.3 The impact of medication belief on medication adherence

There were significant relationships between specific-concern and general-harm with medication adherence. The result for general-harm scale is consistent with a previous study that found patients that have lesser beliefs about the potential harmful effect of medication predicts their adherence level to medications (42). In this study, it can be assumed that specific-concern and general-harm scale predicted medication adherence among elderly. Weaker concern that consuming medication are associated

with long-term adverse effect has lowered the risk of medication non-adherence among care home residents. This finding is similar with studies in Portugal and United States that report higher rates of adherence to medication in patients with lower beliefs in specific-concern (42,43).

5.0 Conclusion

Most of the elderly have low risk to medication non-adherence as the presence of the nurse and staff in care home settings play significant role in dispensing the medication to them. Majority of the elderly have stronger beliefs in specific-necessity scale and weaker beliefs in specific-concern, general-overuse and general-harm scales. Specific-concern and general-harm predict the level of medication adherence and “Having to take medication worries me” item on a specific-concern scale is the best predictor of medication adherence, indicating the importance of addressing issue on a specific-concern and general-harm scale where it can strongly predict non-adherence. A future study on addressing the health education issues and medication beliefs of elderly in care homes is needed.

Acknowledgment

This research was funded by DUCS 600-UiTMSEL (PI.5/4)(059/2018).

Conflict of interest

Authors declare no conflict of interest in the present work.

References

1. United Nations. World Population Aging 2017: Highlights (ST/ESA/SER.A/397). [Internet]. Department of Economic and Social Affairs, Population Division; 2017 [cited 2020 Nov 11]. Available from:

https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf.

2. Thakur R, Banerjee A, Nikumb V. Health problems among the elderly: a cross-sectional study. *Ann Med Health Sci Res*. 2013;3(1):19–25.
3. Tobi SUM, Fathi MS, Amaratunga D. Ageing in place, an overview for the elderly in Malaysia. In Author(s); AIP Conference Proceedings, 2017;1891(1) 10.1063/1.5005434 .
4. Department of Statistics, Malaysia. Current Population Estimates, Malaysia. [Internet] Department of Statistics, Malaysia: [cited 2020 Nov 11]. Available from https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=155&bul_id=OVByWjg5YkQ3MWFZRTN5bDJiaEVhZz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09.
5. Department of Statistics, Malaysia. Population Projection (Revised) Malaysia,2010-2040, Malaysia (2020). [Internet] Department of Statistics, Malaysia: [cited 2020 Nov 11]. Available from https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=118&bul_id=Y3kwU2tSNVFDOWp1YmtZYnhUeVBEdz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09.
6. Yap AF, Thirumorthy T, Kwan YH. Medication adherence in the elderly. *J Clin Gerontol Geriatr*. 2016;7(2):64–7.
7. Ahmad Nizaruddin M, Omar MS, Mhd-Ali A, Makmor-Bakry M. A qualitative study exploring issues related to medication management in residential aged care facilities. *Patient Prefer Adherence*. 2017;11:1869–77.
8. Evangelista RA, Bueno Ade A, Castro PA, Nascimento JN, Araujo NT, Aires GP. Perceptions and experiences of elderly residents in a nursing home. *Rev Esc Enferm USP*. 2014;48 Spec No. 2:81-6.
9. Rolland Y, de Souto Barreto P. Research can improve care in the nursing home. *J Am Med Dir Assoc*. 2013;14(4):233–5.
10. Hoe CS, Kamarulzaman WB, Heang LT. Elderly people in old age homes: Engaging factors leading to institutionalization [Internet]. *Iarjournal.com*. [cited 2020 Nov 13]. Available

- from: http://www.iarjournal.com/wp-content/uploads/IARJ-SS-4_1_28-41.pdf
11. Department of Social Welfare (DSW) Statistics Report. Table 14.1 : Number of Registered Care Centres, Number of Carer and Residents by State and Category, [Internet] 2018. Available from: http://www.jkm.gov.my/jkm/uploads/files/penerbitan/inlay_statistik_v5_final.pdf
 12. Gomes D, Placido AI, M6 R, Sim6es JL, Amaral O, Fernandes I, et al. Daily medication management and adherence in the polymedicated elderly: A cross-sectional study in Portugal. *Int J Environ Res Public Health*. 2019;17(1):200.
 13. Sakthivel V, Krishnasamy V, Mehalingam V. Level of medication adherence and its associated factors among patients receiving antiretroviral therapy at a tertiary care hospital in south India. *J Caring Sci*. 2020;9(2):93–7.
 14. Schüz B, Marx C, Wurm S, Warner LM, Ziegelmann JP, Schwarzer R, et al. Medication beliefs predict medication adherence in older adults with multiple illnesses. *J Psychosom Res*. 2011;70(2):179–87.
 15. Kleinsinger F. The unmet challenge of medication nonadherence. *Perm J*. 2018;22:18–033.
 16. Thorneloe RJ, Griffiths CEM, Emsley R, Ashcroft DM, Cordingley L, British Association of Dermatologists Biologic Interventions Register, et al. Intentional and unintentional medication non-adherence in psoriasis: The role of patients' medication beliefs and habit strength. *J Invest Dermatol*. 2018;138(4):785–94.
 17. Roy NT, Sajith M, Bansode MP. Assessment of factors associated with low adherence to pharmacotherapy in elderly patients. *J Young Pharm*. 2017;9(2):272–6.
 18. Gonzalez JS, Tanenbaum ML, Commissariat PV. Psychosocial factors in medication adherence and diabetes self-management: Implications for research and practice. *Am Psychol*. 2016;71(7):539-551.
 19. Östbring MJ, Eriksson T, Petersson G, Hellström L. Medication beliefs and self-reported adherence—results of a pharmacist's consultation: a pilot study. *Eur J Hosp Pharm Sci Pract*. 2014;21(2):102–7.
 20. Fahrni ML, Azmy MT, Usir E, et al. Inappropriate prescribing defined by STOPP and START criteria and its association with adverse drug events among hospitalized older patients: A multicentre, prospective study. *PLoS One* 2019; 14: e0219898.
 21. Zermansky AG, Alldred DP, Petty DR, Raynor DK. Striving to recruit: the difficulties of conducting clinical research on elderly care home residents. *J R Soc Med*. 2007;100(6):258–61.
 22. Ting CY, Aduce SAZ, Loo SC, et al. Interventions on improving medication adherence in Malaysia: A mini review. *J Young Pharm* 2019; 11: 122–125.
 23. Abdullah NF, Khuan L, Theng CA, et al. Effect of patient characteristics on medication adherence among patients with type 2 diabetes mellitus: a cross-sectional survey. *Contemp Nurse* 2019; 55: 27–37.
 24. Weng WL, Hui GLN, Ahmad KB. Evaluation of medication adherence in elderly patients taking anti-hypertensive. *Sarawak Journal of Pharmacy*. 2017;1(1):19–32.
 25. Liew NY, Chong YY, Yeow SH, et al. Prevalence of potentially inappropriate medications among geriatric residents in nursing care homes in Malaysia: a cross-sectional study. *Int J Clin Pharm* 2019; 41: 895–902.
 26. Chew S, Lai PSM, Ng CJ. Usability and utility of a mobile app to improve medication adherence among ambulatory care patients in Malaysia: Qualitative study. *JMIR MHealth UHealth* 2020; 8: e15146.
 27. Wei CT, Omar MS. Current practice and determinants of medication management in long term care facilities. *Arch Pharm Pract*. 2016;7(3):73–9.
 28. Jin H, Kim Y, Rhie SJ. Factors affecting medication adherence in elderly people. *Patient Prefer Adherence*. 2016;10:2117–25.
 29. Verhagen AP. Beliefs about medicine questionnaire. *J Physiother*. 2018;64(1):60.
 30. Loganathan M, Dali AF, Muda MR, Usir E, Thiyagu K. Medication Safety Alert Tool for Elderly. Invention, Innovation & Design Exposition [Internet] 2017. Available from:

- <https://prisma.uitm.edu.my/prisma/view/viewPdf.php?pid=100332>
31. Sweileh WM, Zyoud SH, Abu Nab'a RJ, Deleq MI, Enaia MI, Nassar SM, et al. Influence of patients' disease knowledge and beliefs about medicines on medication adherence: findings from a cross-sectional survey among patients with type 2 diabetes mellitus in Palestine. *BMC Public Health*. 2014;14(1):94.
 32. Ruppap TM, Dobbels F, De Geest S. Medication beliefs and antihypertensive adherence among older adults: a pilot study. *Geriatr Nurs*. 2012;33(2):89–95.
 33. Malaysian Healthcare Performance Unit, Malaysian Health at a Glance:2018, Ministry of Health Malaysia: Putrajaya. [cited 2020 Nov 13]. Available from: <https://www.moh.gov.my/moh/penerbitan/MYH AAG2018.pdf>
 34. Schmitt Júnior AA, Lindner S, Helena ET de S. Assessment of adherence in elderly patients in primary care. *Rev Assoc Med Bras*. 2013;59(6):614–21.
 35. Saqlain M, Riaz A, Malik MN, Khan S, Ahmed A, Kamran S, et al. Medication adherence and its association with health literacy and performance in activities of daily livings among elderly hypertensive patients in Islamabad, Pakistan. *Medicina (Kaunas)*. 2019;55(5):163.
 36. Geboers B, Brainard JS, Loke YK, Jansen CJM, Salter C, Reijneveld SA, et al. The association of health literacy with adherence in older adults, and its role in interventions: a systematic meta-review. *BMC Public Health*. 2015;15(1):903.
 37. Goswami S, Sahai M. A Study of Morbidity Pattern in Elderly Population. Goswami S, Sahai M. A Study of Morbidity Pattern in Elderly Population. *European Researcher*. 2016;103(2):119–28.
 38. Gordon AL, Franklin M, Bradshaw L, Logan P, Elliott R, Gladman JRF. Health status of UK care home residents: a cohort study. *Age Ageing*. 2014;43(1):97–103.
 39. Victor C, Davies S, Dickinson A, Morbey H, Masey H, Gage H, et al. "It just happens". Care home residents' experiences and expectations of accessing GP care. *Arch Gerontol Geriatr*. 2018;79:97–103.
 40. Ramli A, Ahmad NS, Paraidathathu T. Medication adherence among hypertensive patients of primary health clinics in Malaysia. *Patient Prefer Adherence*. 2012;6:613–22.
 41. Fischer W, Brandstetter S, Brandl M, Finger T, Böhmer MM, Pfeifer M, et al. Specific, but not general beliefs about medicines are associated with medication adherence in patients with COPD, but not asthma: Cohort study in a population of people with chronic pulmonary disease. *J Psychosom Res*. 2018;107:46–52.
 42. Dias A, Pereira C, Monteiro MJ, Santos C. Patients' beliefs about medicines and adherence to medication in ischemic heart disease. *Aten Primaria*. 2014;46 Suppl 5:101–6.
 43. Shiyanbola OO, Farris KB, Chrischilles E. Concern beliefs in medications: changes over time and medication use factors related to a change in beliefs. *Res Social Adm Pharm*. 2013;9(4):446–57.