Original Article

Current practice and determinants of medication management in long-term care facilities

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ABSTRACT

Background: Medication management is a complex process which involves different phases including prescribing, transcribing, ordering, dispensing, supplying, administering, and storing. This study aimed to assess the medication adherence and its barriers among the residents in long-term care facilities to identify residents who are at risk for medication-related problem and resident`s beliefs toward medication.
Methods: A prospective cross-sectional study was conducted in 24 long-term care facilities in Malaysia. The Chi-square test was performed to see any association between the adherence level and medication beliefs.
Results: A total number of 185 residents were interviewed and majority of the residents were identified as highly adherent to their medication. There was a significant association found between duration of disease and medication adherence ($P = 0.002$). With regards to their belief toward medication, most of the residents had weak necessity scores (mean = 16.85, standard deviation [SD] = ±3.41) and strong concern scores (mean = 13.91. SD = ±2.684). There was a significant association between medication beliefs and medication adherence ($P = 0.007$), and a high number of residents were identified as at high risk for medication-related problems.
Conclusion: Residents' risk for medication-related problems and their overall well-being should be emphasized and related actions should be taken to rectify the problems.

Key words: Adherence, believe, medication, risk

INTRODUCTION

Medication management is a very complicated process which involves different phases including prescribing, transcribing, ordering, dispensing, supplying, administering, and storing.[1] Evidence suggested that at each phase of the cycle, errors do occur adversely influencing patients' safety, which is a priority in today's practice in long-term care facilities.[2] With changes in the society and promotion of early hospital discharge, there has been an increasing number of admissions into the long-term care facilities.[3] Adverse drug events are common in long-term care facilities, particularly nursing home, and the residents are vulnerable to such events due to a high incidence of polypharmacy and changed pharmacokinetics and pharmacodynamics.[4] As people age, those who suffered from chronic conditions normally require many medications.[5] A problem arises for some of these people as they might suffer from a slight memory loss which makes them noncompliant to the medications.

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Medication nonadherence rate is high among elderly, especially those from low socioeconomic status and low educational status.[6] Although a few strategies were employed, such as patient counseling, reduction in dosage frequency, use of medication list, dose administration aids, and telephone follow-up to improve medication adherence, they were not still effective in correcting the intentional medication nonadherence. Despite all of these efforts, the rate of medication adherence among residents in long-term care facilities was only half which significantly contributed to higher rate of morbidity and mortality.[7]

There were 8.4% of observed medication administration errors reported in long-term care facilities.[8] The common causes of medication administration error were incorrect crushing of medication, not supervising the medication intake, incorrect timing of taking medication, improper staff training and qualification, and poor communication between the caretaker and resident. Therefore, methods to systematically identify and address the medication-related errors should be employed to significantly improve the clinical outcomes.[9] Nevertheless, there is a lack of local studies on medication management in long-term care facilities in Malaysia. Hence, this study aimed to assess medication adherence and its barriers among the residents in long-term care facilities to identify residents who are at risk for medication-related problem and resident`s beliefs toward medication.

METHODS

A prospective, cross-sectional, researcher-assisted questionnaire study was conducted in 24 long-term care facilities including nursing home, residential care home, and elderly care center registered under the Central Welfare Council Malaysia and Ministry of Social Welfare in Kuala Lumpur and Selangor, Malaysia, from April 2014 to December 2014. A list of all registered long-term care centers, whether government- or private-run, was obtained from the Ministry of National Unity and Community Development, Malaysia, with sampling size of 200 residents. Study participants were required to be at least 18 years old, were staying at a long-term care facility for at least 3 months, and were prescribed at least one medication to be taken daily for at least 1 month. Those who were unable to provide informed consent will be excluded from the study. The study was reviewed and approved by the Research Ethics Committee, Universiti Kebangsaan Malaysia, Malaysia. This study utilized a collection of validated instruments that measured medication adherence, potential medication risk, and resident's beliefs about medication while current system of medication supply practiced in study sites was determined based on the observation.

The Morisky Medication Adherence Scale-8 was used to assess patient's adherence level to medications. There were eight questions evaluating patients' forgetfulness, patients understanding of the need for continued therapy, and whether the patient felt it was a hassle sticking to daily medication treatment plan.[10] For questions 1, 2, 3, 4, 6, and 7, a score of zero was given for positive response whereas a score of one was given for negative response (yes = 0, no = 1). Conversely, for item 5, a score of zero was given for negative response whereas a score of one was given for positive response (yes = 1, no = 0). For item 8, a score of one for "Never/Rarely" whereas a score of zero for "Once in a while"/"Sometimes"/"Usually"/"All the time." The total score of Morisky Medication Adherence Scale-8 (MMAS-8) was 8. Higher score indicates a higher level of self-reported adherence. Adherence level was categorized as high (score: 8), medium (score: 6 or 7), and low (score <6). Residents who had MMAS-8 score 8 were considered having good adherence level while residents who had MMAS-8 score <8 were considered having poor adherence level.

Residents' beliefs about their medications were assessed using a set of questionnaires comprisingtwo five-item scales that were necessity scales and concerns scales.[11] Questions 1, 3, 4, 7, and 10 belonged to necessity scales whereas questions 2, 5, 6, 8, and 9 belonged to concerns scales. Respondents indicated their degree of agreement with each statement about medicines on a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. Scores obtained for the individual items within each scale were summed to give a scale score. Each scale score will range from 5 to 25. The score can be dichotomized in the midpoint which is 15 to indicate stronger beliefs or weaker beliefs. An indication of the relative importance of these attitudes for individual residents was obtained by calculating the necessity-concerns differential. This was calculated as the difference between necessity and concerns scores and, thus, had a possible range of −20–20. A positive differential indicated a belief of medication benefits out-weight cost whereas a negative differential indicated a belief of cost out-weight benefits of medication. A zero differential means indifferent attitude.

The residents' risks for medication-related problems were assessed using ten questions in the questionnaire and all the questions had "yes" or "no" answers.[12] If the residents answered two or more "yes" in the questionnaires, it indicated that the residents had high medication risk.

Statistical analysis was performed by using the Statistical Package for Social Sciences (SPSS) software (version 22, SPSS, Inc, Chicago, IL, USA). The demographic information of the residents obtained from the questionnaires was analyzed using descriptive analysis. The Yate's correction of Chi-square was used to determine the presence of association between the adherence level and medication beliefs. $P < 0.05$ was considered statistically significant.

RESULTS

There were a total number of 185 residents recruited in this study [Table 1]. The adherence level of the residents was high and most residents with self-reported low medication adherence came from the age group of 61 to 80 ($n = 18$, 66.6%). The disease duration was found to be significantly associated with self-reported adherence level ($\chi^2 = 17.29$, $P = 0.002$). Nevertheless, there was no significant association between self-reported medication adherence level with gender, age, ethnicity,

Table 1: Sociodemographic characteristics of the residents (*n*=185)

Variable/characteristic	Total participants (*n*=185)	Adherence level (*n*, %)			χ^2, *P*
		High adherence (*n*=85)	Medium adherence (*n*=73)	Low adherence (*n*=27)	
Gender					
Male	92 (49.7)	38 (44.7)	40 (54.8)	14 (51.9)	1.656, 0.437[a]
Female	93 (50.3)	47 (55.3)	33 (45.2)	13 (48.1)	
Age (years)					
21-40	15 (8.1)	9 (10.6)	4 (5.5)	2 (7.4)	6.057, 0.417[b]
41-60	34 (18.4)	20 (23.5)	10 (13.7)	4 (14.8)	
61-80	106 (57.3)	44 (51.8)	44 (41.5)	18 (66.6)	
81-100	30 (16.2)	12 (14.1)	15 (60.3)	3 (11.1)	
Ethnicity					
Malay	22 (11.9)	10 (11.8)	7 (9.6)	5 (18.5)	2.159, 0.71[b]
Chinese	140 (75.7)	63 (74.1)	57 (78.1)	20 (74.1)	
Indian	23 (12.4)	12 (14.1)	9 (12.3)	2 (7.4)	
Education level					
No formal education	67 (36.2)	27 (31.8)	30 (41.1)	10 (37)	4.451, 0.619[b]
Primary school	48 (25.9)	22 (25.9)	17 (23.3)	9 (33.3)	
Secondary school	61 (33.0)	33 (38.8)	22 (30.1)	6 (22.2)	
University and above	9 (4.9)	3 (3.5)	4 (5.5)	2 (7.4)	
Marital status					
Married	89 (48.1)	40 (47.1)	34 (46.6)	15 (55.6)	2.13, 0.712[b]
Not married	92 (49.7)	42 (49.4)	38 (52)	12 (44.4)	
Divorced	4 (2.2)	3 (3.5)	1 (1.4)	0 (0)	
Number of diagnoses					
One	96 (51.9)	43 (50.6)	41 (56.2)	12 (44.4)	1.984, 0.739[a]
Two	60 (32.4)	30 (35.3)	21 (28.8)	9 (33.3)	
Three	29 (15.7)	12 (14.1)	11 (15.1)	6 (22.3)	
Disease duration (years)					
1-10	143 (77.3)	75 (88.2)	45 (61.6)	23 (85.2)	17.29, 0.002[b,Ʊ]
11-20	35 (18.9)	9 (10.6)	23 (31.5)	3 (11.1)	
21-30	7 (3.8)	1 (1.2)	5 (6.9)	1 (3.7)	
Length of stay (years)					
1-5	24 (13)	12 (14.1)	6 (8.2)	6 (22.2)	8.211, 0.413[b]
6-10	151 (81.6)	70 (82.4)	62 (84.9)	19 (70.4)	
11-15	7 (3.8)	1 (1.2)	4 (5.5)	2 (7.4)	
16-20	2 (1.1)	1 (1.2)	1 (1.4)	0 (0)	
21-25	1 (0.5)	1 (1.2)	0 (0)	0 (0)	

[a]Chi-square test, [b]Yate's correction of Chi-square, [Ʊ]Significant association

education level, marital status, length of stay, and number of diagnoses.

Table 2 shows the individual questions of MMAS-8 questionnaire and the number of residents answering "yes" in the first seven questions followed by the number of residents answering "never/rarely," "once in a while," "sometimes," "usually," and "all the time." It was found that there were only two questions (item 1 and item 4) where the residents had answered "yes" for a higher number which accounted for 39 (21.1%) and 42 (22%), respectively. For the last question, more than three-quarters of the residents (n = 145, 78.4%) answered "never/rarely."

The majority of the respondents (n = 128, 69.2%) had low necessity of medication (scores lower than scale midpoint) with the mean score of 16.85 (standard deviation [SD] ±3.41) [Table 3]. Most of the residents (n = 133, 71.9%) expressed strong concerns about the potential side effects of medication (scores greater than scale midpoint) with the mean score of 13.91 (SD ± 2.684). About 20% of the residents demonstrated lower necessity scores than the concerns scores (negative value for the necessity-concerns differential). The necessity-concerns differential had a mean of 2.89 with an SD of ± 3.911. There was a significant association found between resident's beliefs toward medication and adherence level (χ^2 = 13.947, P = 0.007).

There was a huge number of respondents (n = 148, 80%) who were categorized as having high risk for medication-related problems [Table 4]. Nonetheless, there was no significant association found between the demographic variables and medication risk. Overall, most of the residents who were at high-medication risk (n = 84, 56.8%) came from the age group of 61 to 80. It was also found out that there were 27 of 29 residents (93%) having at least three diagnoses or comorbidities were determined to be at high-medication risk.

Table 2: Percentage of residents who answered "yes" in self-reported adherence questionnaire

Question	Yes, *n* (%)
1. Do you sometimes forget to take your pills?	39 (21.1)
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past 2 weeks, was there any day when you did not take your medicine?	10 (5.4)
3. Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	7 (3.8)
4. When you travel or leave home, do you sometimes forget to bring along your medication?	42 (22.7)
5. Did you take your medicine yesterday?	8 (4.3)
6. When you feel like your health condition is under control, do you sometimes stop taking your medicine?	24 (13)
7. Taking your medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	24 (13)
8. How often do you have difficulty remembering to take all your medications	
Never/rarely	145 (78.4)
Once in awhile	20 (37)
Sometimes	3 (1.6)
Usually	0 (0)
All the time	0 (0)

Table 3: Scale means and standard deviations for beliefs about medication questionnaire scales

Scale	Residents (*n*=185)
Necessity, *n* (%)	
Strong necessity	57 (30.8)
Weak necessity	128 (69.2)
Mean	16.85
SD	3.41
Concern, *n* (%)	
Strong concern	133 (71.9)
Weak concern	52 (28.1)
Mean	13.91
SD	2.684
Necessity-concerns differential, *n* (%)	
Believe	135 (73)
Indifferent	13 (7)
Do not believe	37 (20)
Mean	2.89
SD	3.911

SD=Standard deviation

DISCUSSION

The life expectancy of female at the age of 50 years had increased recently worldwide.[13] In Malaysia, female occupied about 50.9% from the total of 2.25 million elderly population (Department of Statistics Malaysia 2010). This higher percentage of women was contributed by a higher life expectancy among female (77.2 years in female vs. 72.3 years in male).[14] There was a slightly higher number of female residents observed in this study. Another possible reason was that female in the long-term care facilities had higher morbidity than male, therefore, required more thorough residential care.[15,16] For the educational level, most of the residents had no formal education, followed by secondary school, primary school, and university level. Only a few of the residents had tertiary education. This was because, during the old residents' era, the chance of

Table 4: Characteristics of residents at and not at risk

Variable/ characteristic	Total	Not at risk (*n*=37)	At risk (*n*=148)	χ^2, *P*
Gender				
Male	92 (49.7)	18 (48.6)	74 (50)	0.022, 0.883[a]
Female	93 (50.3)	19 (51.4)	74 (50)	
Age				
21-40	15 (8.1)	0 (0)	15 (10.1)	4.628, 0.201[a]
41-60	34 (18.4)	7 (18.9)	27 (18.2)	
61-80	106 (57.3)	22 (59.5)	84 (56.8)	
81-100	30 (16.2)	8 (21.6)	22 (14.9)	
Ethnicity				
Malay	22 (11.9)	3 (8.1)	19 (12.8)	3.108, 0.54[b]
Chinese	140 (75.7)	32 (86.5)	108 (73)	
Indian	23 (12.4)	2 (5.4)	21 (14.2)	
Others	0 (0)	0 (0)	0 (0)	
Education level				
No formal education	67 (36.2)	13 (35.1)	54 (36.5)	0.445, 0.931[a]
Primary school	48 (25.9)	11 (29.7)	37 (25)	
Secondary school	61 (33.0)	11 (29.7)	50 (33.8)	
University and above	9 (4.9)	2 (5.4)	7 (4.7)	
Marital status				
Married	89 (48.1)	13 (35.1)	76 (51.4)	3.118, 0.54[b]
Not married	92 (49.7)	23 (62.2)	69 (46.6)	
Divorced	4 (2.2)	1 (2.7)	3 (2)	
Length of stay				
1-5	24 (13)	5 (13.5)	19 (12.8)	1.084, 0.997[b]
6-10	151 (81.6)	30 (81.1)	121 (81.8)	
11-15	7 (3.8)	2 (5.4)	5 (3.4)	
16-20	2 (1.1)	0 (0)	2 (1.4)	
21-25	1 (0.5)	0 (0)	1 (0.7)	
Number of diagnoses				
1	96 (51.9)	23 (62.2)	73 (49.3)	4.052, 0.132[a]
2	60 (32.4)	12 (32.4)	48 (32.4)	
3	29 (15.7)	2 (5.4)	27 (18.2)	
Disease duration				
1-10	143 (77.3)	32 (86.5)	111 (75)	3.074, 0.215[a]
11-20	35 (18.9)	5 (13.5)	30 (20.3)	
21-30	7 (3.8)	0 (0)	7 (4.7)	

[a]Chi-square test, [b]Yate's correction of Chi-square

obtaining high education was very low compared with nowadays.

The majority of residents in this study demonstrated high medication adherence and the main reason for this was due to the caregivers' role. The caregivers normally administered the medications to the residents by themselves to ensure that the patient did not forget to take the medications. They also did this with the help of compliance aids such as dosette boxes and this method could ensure the high medication adherence in long-term care facilities.[17] A resident who had been attended by caregivers will achieve higher medication adherence than those without being attended.[18]

In this study, the disease duration was found to be significantly associated with adherence toward medication. Residents with acute illnesses were often associated with higher compliance than those with chronic illnesses, and long duration of the disease may adversely affect compliance.[19,20] Similarly, a longer duration of treatment period might also compromise resident's compliance.[21] Furthermore, low education level also found to cause low medication adherence.[22] This was because, a low education level will cause a low knowledge about the use of medications, especially those from the Western origin in treating their diseases. Besides, a low-literacy level will also decrease their capabilities to recognize the right drug to use at the appropriate time.

Medication-related factors could be a barrier to medication adherence among the residents in long-term care facilities. Residents who used more than one type of medication were more likely to believe that they were in need of treatment and, therefore, were more likely to adhere to their medical regimen. Nevertheless, few studies had shown different outcomes,[18] for example, the size of the medication or medication pack could be the reason for noncompliance. Hence, barriers that could decrease the medication compliance should be determined to find out solutions to resolve it.

In this study, the necessity score for the residents in long-term care facilities was low but their concerns score was high. It was probably due to the low education level achieved among the residents.[23] As mentioned, most of the residents in long-term care facilities were elderly, and when they were young, the chance of getting a formal education was low. The culture of using traditional medicines which were comparatively cheaper and easier might prompt them to have low necessity scores on modern medications. Most of them were worried about the possible side effects of modern medication due to a lack of knowledge.[18]

It was also demonstrated that resident's beliefs toward medication were strongly associated with their adherence level. Medication adherence was indeed influenced by an implicit cost-benefit analysis in which beliefs about the necessity of prescribed medication for maintaining health or avoiding illness were weighed against concerns about the negative medications' side effect.[22] Besides, the necessity-concerns differential had a stronger correlation with medication adherence

as compared to necessity or concerns score alone. Nonetheless, the cost-benefit analysis may be implicit rather than explicit. For example, it might simply be a reflection of the fact that patient who did not perceive their medication to be important (low scores on the necessity scale) may be more likely to forget about it.

The mean for the necessity-concerns differential was low which meant that the cost-benefit analysis of the residents with negative scales differential would favor a lower cost of medications. Most of the residents in long-term care facilities were old and financially incapable, and they need to rely on their family members to provide for them. With the staggering rise in medication price nowadays regardless of chronic medications and acute medications,[24] an additional cost of medication to add more burden to their family members would be the least, the residents would want to see.

In general, residents in long-term care facilities appeared to be particularly vulnerable to adverse drug reactions.[25] Many studies had shown a correlation between increasing age and adverse drug reactions rate. It was reported that elderly residents in care facilities would have more chronic diseases and an increase in medications intake would subsequently increase the risk of adverse effects.[26] Older people were more susceptible to medication-related problems such as adverse effects, drug-drug interaction, and noncompliance compared to the younger people.[27] Hence, it would be the main reason for a higher number of respondents at medication risk.

The second reason was the elderly residents will be more associated with chronic cardiac diseases such as chronic heart failure and atrial fibrillation leading to the use of digoxin and warfarin, respectively.[28] Both of these drugs were listed in question 3 of the questionnaire and may be accounted for the high number of residents at high risk for medication-related problems. From this study, there were 103 respondents reported with the use of warfarin and 120 respondents reported with the use of digoxin. The quality and safety of medications therapy, especially the warfarin in the long-term care facilities setting, had come under particular scrutiny.[29] Approximately, 10% of residents received treatment with warfarin therapy for various indications such as the atrial fibrillation mentioned above; however, the percentage of time spent in the therapeutic range was <50%. Often there is little physician involvement in managing residents` medications in long-term care facilities.[30] Hence, the risk for the medication-related problems will be increased. The final reason will be the insufficient and improper management of financing of long-term care facilities to see the inadequate incentives to be utilized in the development of genuine interventions which could lead to improvement in quality and safety of care in these settings.

To the best of our knowledge, our study is the first in highlighting current medication management in long-term care facilities, particularly in Malaysia. The main limitations of this study relate to the lacked number of government-run facilities that agreed to take part in this study.

CONCLUSION

The medication management in long-term care facilities involves many processes, and thus, an increase in the medication errors through any one of these processes is inevitable. The slight difference in the medication management between the government and private long-term care facilities could be further proved that it could be detrimental to the residents' risk for medication-related problems and their overall well-being. With an expected increase in long-term care facilities in the coming years, there is a need to review and revamp the current medication management in these facilities. A future study on ways to improve medication management in long-term care facilities is needed.

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Conflicts of interest
There are no conflicts of interest.

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