

Medication-handling Challenges among Visually Impaired Population

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Abstract

Objective: Visually impaired individuals are particularly at higher risk for experiencing a medication error. The aim of this study is to identify the problems encountered by the visually impaired population when handling their medication. **Methods:** A cross-sectional survey was conducted using an interviewer-guided questionnaire with 100 visually impaired individuals. The questionnaire comprised a series of questions in medication management. **Results:** All of the respondents perceived that self-administration of medication was a challenging task. A total of 89% of respondents were unable to read the prescription labels, 75% of respondents did not know the expiry date of their own medication, and 58% of respondents did not know the name of the medication. With regard to storage of medication, 72% of respondents did not practice appropriate methods to store their medication, and 80% of respondents kept the unused medication. All of the respondents disposed leftover medication through household rubbish. A total of 64% of respondents never practice medication review. Most (96%) of them did not tell health-care providers when they faced difficulties in handling their medication. **Conclusion:** Most of the visually impaired individuals did not receive appropriate assistance regarding medicine use and having low awareness in medication management. This can lead to increased risk of medication errors or mismanagement among visually impaired population. Hence, effective strategies, especially in pharmaceutical care services, should be structured to assist this special population in medication handling.

Keywords: Medication error, medication handling, self-management, visually impaired

INTRODUCTION

Medication safety issues related to visual impairment received less attention as compared to other medical-related problems. The global estimates of people with visual impairment in 2010 were 39 million of blindness and 246 million of low vision.^[1] Visual impairment is often age-related, which predominantly occurs among adults with 50 years and older because of cataract or uncorrected refractive errors.^[1,2] Elderly patients with vision loss often encounter additional practical difficulties during medication management.^[3] The practice of polypharmacy, gradual vision loss, and forgetfulness causes the elderly more prone to medication errors which can lead to hospitalization or fatalities.^[4] Common problems encountered by low-vision individuals include fail to confirm the medication taken, mistakenly took the expired drug, inability to read the refill instructions, and unable to differentiate the medication

containers or packaging.^[5] Individuals who suffered from visual problems were also unable to identify the color, shape, and markings on their medications.^[6]

Visually impaired individuals have limited access to the information resources^[7] as such the level of health literacy among them remains low. The presumption of health professionals that visually impaired patients are less suitable to manage their own medication may be contributed to this issue.^[8] Visually impaired population often need to seek help

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from family members or caregivers, rely on their memories, and use of assisting device in managing their medications.^[5,9] Previous studies conducted on drug management were mainly focusing on the scope of practice in hospital setting and among the health-care professionals, but there were no studies focusing on medication handling among patients, especially among visually impaired population. Thus, this study was aimed to identify the challenges faced by the visually impaired population during medication management. The findings are beneficial to the caregivers and health-care professionals to support safer handling of medication among this population.

METHODS

Study design

A cross-sectional study was conducted using an interviewer-guided questionnaire. The questionnaire was presented in written form and was conducted face to face by the interviewer. A universal sampling method was utilized to identify the cases. The study was approved by the Universiti Kebangsaan Malaysia Research Ethics Committee (UKM1.5.3.5/244/NF-042-15).

Study population

A total of 100 respondents were enrolled at public locality surrounding Kuala Lumpur. Those respondents who were 18 years old and above, experienced visual impairment that fit either the criterion of blindness or visual impairment category 2 (visual acuity $<6/60$; $\geq 3/60$) according to the International Statistical Classification of Diseases,^[10] and was currently or had used at least two types of either prescription or over-the-counter drugs in the past 2 weeks before the interview were included in this study. Respondents ($n = 25$) were excluded from the study if they have uncorrectable hearing problems, had language barrier, or were unwilling to participate in the study.

Questionnaire

The questionnaire was developed based on available published literature regarding the practices and beliefs in medication management by the visually impaired population.^[11-14] It comprised 27 questions. The scope of questions extended from sociodemographic data into every process of managing medication in daily life. The first six questions made up the demographic data comprised gender, age, religion, onset of blindness, visual impairment category, and living arrangement. Six main processes of medication management were adopted from the Australian Pharmaceutical Advisory Council^[15] and formed six domains of the questionnaire, which were (i) self-administration, (ii) access to information sources, (iii) maintain current medication list, (iv) storage of medicine, (v) disposal of medicine, and (vi) medication reviewed by health-care team.

Self-administration

Respondents were being asked about the frequency of facing difficulties during the process of self-administration of

medication. They were required to rate the frequency ranged from 1 ("Never") to 5 ("Always"). Respondents were also required to rate the level of difficulties on the independent use of dosage forms. The rate of difficulty ranged from 1 ("Easiest") to 5 ("Hardest"). The five most commonly dispensed dosage forms that included in questionnaire were tablet, capsule, liquid formulations, topical, and eye/ear drops. The use of assisting device during self-administration of medicine was identified through the frequency of usage of different visual aids listed, and the effects of its usage were examined.

Access to information sources

The most commonly used source of health information on medication and the perception on the credibility of the information were assessed. Respondents were asked to state their preferred source of information through an open-ended question. To identify the frequency of problems in accessing medication and labeling information, respondents were requested to rate from 1 ("Never") to 5 ("Always").

Maintain current medication list

Respondents were asked whether they possessed a written list of their prescription and nonprescription medication. The knowledge of health status and medication adherence of respondents was evaluated through recalling the drug's name, frequency of dosage, expiry date, and indication of medication taking. Respondents were free to show their medication if they brought it along with them.

Storage of medicine

The appropriateness of storage of medication was examined by asking the location where respondents normally stored their medication. Respondents were asked whether they did medication separation if they had more than two types of medications. Question exploring practice of removing the original packaging of medication and putting them in another container was directed to respondents to investigate the disciplinary of medication storage. If the respondents answered "Yes" to this question, they were further probed the types of container used.

Disposal of medicine

Respondents were asked whether they kept any other medication apart from the medication they are currently taking. The practice of retaining medicine for reuse among visually impaired population was explored. Once they answered "Yes," types of medication kept were further investigated. Methods of handling leftover medication were being asked as well.

Medication reviewed by health-care team

The final part of the survey was exploring the practice of medication review among visually impaired population. Respondents were asked whether their medication was reviewed by any health-care provider in the past 6 months. The awareness of visually impaired population toward the dangerous of drugs was retrieved by asking whether they have used medicines of their own without any consultation from health-care providers in the past 6 months. The last question

was to find out the initiative of respondents to voice out the challenges they faced during handling of medication to relevant health-care professionals.

Statistical analysis

The results of the study were analyzed using the Statistical Package for the Social Sciences version 20.0 (IBM Corporation, Armonk, NY, USA). Chi-square test was performed to determine the association between frequency and specific conditions in each process of medication management. Statistical difference was set at probability level of $P < 0.05$.

RESULTS

The demographic data of the 100 respondents are shown in Table 1. Sixty-two percent of the cases were blind and 38% were visually impaired under category 2. Table 2 shows the frequency of problems faced by the respondents during self-administration of medications. The results showed that the respondents had less practical difficulties with medicine taking, including open and differentiate the medication containers. Intake of wrong medication had not observed in majority of the respondents. Although 6% of cases sometimes would be wrongly taken their medication, no detrimental effects were reported. The association between different dosage forms and level of difficulty in its independent usage was scrutinized using Chi-square test. The results indicated a strong association between each type of dosage form and the level of difficulties in its independent usage [Table 3]. In general, tablet, capsule, and topical preparation were rated as the easiest dosage form to be used whereas liquid preparation and eye/ear drops were rated as the hardest dosage form to manage.

The majority (65%) of respondents did not use the commercially available assisting devices. Table 4 shows the source that the respondents used to retrieve the health information on medications. The preferred sources of information by respondents include health-care professionals, internet, radio, and television. Among all the sources listed, health information provided by the health-care professionals was significantly satisfied by the respondents. This study also found that a majority of respondents (89%) were unable to read the prescription labels completely whereas 73% of them comprehended to the information and indication of medication. The response of the respondents to specific questions on medication handling is shown in Table 5. In general, most of the visually impaired individuals did not practice of maintaining medication list (77%), medication review (64%), repackaging (99%), and medication sorting in separate containers (64%). Among all the prescription medications, the top two prescription medicines were antihypertensive and antidiabetic drug. Most of the respondents did not practice proper way of medication storage, in which they did not have a particular place for storage (23%) and kept medication in plastic bags and cupboard (17%).

Of 100 respondents, 76% of them kept medications which were not in use and half of them practiced self-medication.

Table 1: Demographic profile of the study respondents

| Variables | Percentage (n=100) |
|-----------------------------------|--------------------|
| Gender | |
| Male | 72 |
| Female | 28 |
| Age (years) | |
| 16-40 | 41 |
| 41-60 | 50 |
| 61-70 | 9 |
| >70 | 0 |
| Onset of blindness | |
| Blind from | |
| Birth | 25 |
| Childhood | 12 |
| Early adulthood | 26 |
| Middle or old age (>45 years old) | 2 |
| Visually impaired from | |
| Birth | 18 |
| Childhood | 7 |
| Early adulthood | 8 |
| Middle or old age (>45 years old) | 2 |
| Visual impairment category | |
| Category 2 | 38 |
| Totally blind | 62 |
| Living arrangement | |
| On your own | 25 |
| With family and friends | 73 |
| Special facility | 2 |

Table 2: Percentage of respondents who faced problems during self-administration of medications

| Problem statement | Frequency of problem*; percentage of respondents (n=100) | | | | |
|---|--|----|----|----|---|
| | 1 | 2 | 3 | 4 | 5 |
| Unable to open medication containers | 83 | 3 | 13 | 0 | 1 |
| Unable to differentiate various types of medication containers | 53 | 8 | 25 | 10 | 4 |
| Unable to differentiate various types of tablets/capsule dosage forms | 46 | 10 | 24 | 14 | 6 |
| Forgot to take medication on time | 35 | 9 | 43 | 13 | 0 |
| Taking the wrong medication | 86 | 8 | 6 | 0 | 0 |

*1=Never, 2=Seldom, 3=Sometimes, 4=Often, 5=Always

Table 3: Distribution of respondents based on the difficulties in handling common dosage forms independently (n=100)

| Handling of common dosage form | Level of difficulty* | | | | | χ^2 | P |
|--------------------------------|----------------------|----|----|----|----|----------|-------|
| | 1 | 2 | 3 | 4 | 5 | | |
| Tablet | 58 | 22 | 13 | 7 | 0 | 46.35 | <0.05 |
| Capsule | 10 | 60 | 23 | 6 | 1 | 48.27 | <0.05 |
| Liquid | 5 | 4 | 12 | 36 | 43 | 34.64 | <0.05 |
| Topical | 27 | 10 | 41 | 18 | 4 | 22.38 | <0.05 |
| Eye/ear drops | 0 | 4 | 11 | 33 | 52 | 50.69 | <0.05 |

*1=Easiest, 5=Hardest. Overall $\chi^2=422.1$; $P<0.05$

Table 4: Relationship between most commonly used source of health information on medication and the adequacy of each respective source

| Source of health information | Frequency (n=100) | Adequacy of information | |
|---------------------------------|----------------------|-------------------------|----|
| | | Yes | No |
| Pharmacists | 12 | 6 | 6 |
| Other health-care professionals | 50 | 43 | 7 |
| Family/friends | 23 | 13 | 10 |
| Brochure/pamphlet | 2 | 1 | 1 |
| Others | 13 | 6 | 7 |

Adequacy of information from the source of health information, $\chi^2=13.97$; $P<0.05$

While 64% of respondents chose to dispose of the leftover medication, one-third retained leftover medication for reuse and only 1% of respondents returned the leftover medication to pharmacy. The disposal method of unwanted medicines preferred by the respondents was through household waste. On the other hand, majority (67–96%) of respondents did not inform health-care providers regarding their difficulties during medication handling.

DISCUSSION

Self-administration of medication is the most crucial component to ensure that right medication had been administered in an appropriate dosage form to achieve an effective medication management. McGraw and Drennan reported that self-management of complicated drug regimen was claimed as a challenging task for patients who are experiencing visual defects.^[16] Various methods have been used by the respondents to identify and organize the medications such as marking with rubber band, stapler, and sticker as a marker for identification. This task will become more challenging for those who have compromised vision and cognitive problem at later stage in life due to the need for adaptive period.^[17] The inability of visually impaired individual to read labels required them to be highly dependent on their memories. Therefore, cognitive ability of this population should not be neglected during prescribing, dispensing, or refilling prescriptions.

Each dosage form needs certain procedures to administer or handling. Liquid preparation is the dosage form that most difficult to be handled by the respondents. Although many liquid preparations come with graduated dosing cup, most respondents claimed that they were unable to measure the exact volume of the liquid medication. This might be attributed to the tangible scale of the dosing cup which was too small to be identified. Besides, they found that it is difficult to instill eye/ear drops to the affected area. These findings highlighted the needs for improvement on the design of the dosage form. In the United Kingdom, regulation 21(3) of disability discrimination act was established to address this issue.^[18] It stated that auxiliary aid or service should be provided with “reasonable adjustments” to accommodate all users of the aid or service.

The assisting devices such as Talking Rx and ScripTalk were rarely used among respondents during medication handling. These technologies are expensive and still uncommon in Malaysia. Since this study only involved in those with category 2 visual impairment or complete blindness, magnifying glass was inappropriate as the assisting device. Our study also found that respondents favored Job Access with Speed as an assisting software in medication information management. This screen-reading software converts the content of the computer screen into sound. It helps the respondents in accessing various information resources including health information.

Lack of medication awareness among respondents might be contributed to their omission on other important medication information. They were more concerned about their health recovery rather than their knowledge regarding the taken medication. Tarn *et al.* revealed that only 55% of physicians provided instructions for the use to their patients, and one-third of physicians explained the adverse effects of drug and duration of therapy.^[19] According to a multidisciplinary medication home review among Australian patients, patients’ knowledge on medication especially adverse effect is poor.^[20] This may lead to potentially serious consequences, such as hospitalization or death. Therefore, effective two-way communication between health-care professionals and visually impaired individuals is important for better understanding of several factors in relation to specific medication management. These factors include adverse reactions and side effects, patient’s own preference and physical status, and cognitive status of the patient.^[17]

In view of visually impaired individuals not often accessible to all sources of information, this study had investigated whether the source of information would affect the adequacy of information obtained. The results had been shown that the credibility of information relied heavily upon the right source of information. Respondents claimed that the health information obtained from family or friends was relatively insufficient and unreliable. While most respondents preferred health-care professionals, some of them preferred electronic media such as radio as major source of information. A single form of information format is insufficient to help them in gaining access to the information. Therefore, it is suggested that a range of formats, such as audio presentation and Braille, should be used to enhance the quality and accessibility of the information among visually impaired individuals.^[21]

This study also revealed that most respondents were unable to read the prescription labels and the assistance from health-care providers or caregivers were needed to explain the information on the labels. As such, the respondents’ understanding on medications was solely depending on the person who delivered the relevant information to them. Drug labels are developed to help patients understand their medication information, including drug indication and side effects.^[22] It is only effective if patients can read and understand the content. However, reading prescription label is a difficult task for visually impaired individual, especially the warning or instructions of

Table 5: Response to specific questions on medication handling

| Item | Answer | Percentage (n=100) | χ^2 | P |
|---|---|--------------------|----------|-------|
| Maintenance of current medication list [#] | Yes | 23 | 15.73 | <0.05 |
| | No | 77 | | |
| Knowledge of own medication [#] | Yes | 42 | 1.29 | >0.05 |
| | No | 58 | | |
| Name of drug | Yes | 93 | 45.37 | <0.05 |
| | No | 7 | | |
| Frequency of dosage | Yes | 25 | 13.33 | <0.05 |
| | No | 75 | | |
| Expiry date | Yes | 100 | 66.67 | <0.05 |
| | No | 0 | | |
| Indication | Yes | 36 | 4.00 | <0.05 |
| | No | 64 | | |
| Separation of >2 types of medication in different container [#] | Yes | 1 | 63.19 | <0.05 |
| | No | 99 | | |
| Removal of original packaging and put in new container [#] | Yes | 76 | 14.50 | <0.05 |
| | No | 24 | | |
| Keep unneeded medication [#] | Yes | 36 | 4.00 | <0.05 |
| | No | 64 | | |
| Medication review [#] | Yes | 44 | 0.72 | >0.05 |
| | No | 56 | | |
| Use medication on own without consulting health-care professionals [#] | Yes | 9 | 40.41 | <0.05 |
| | No | 91 | | |
| Inform problems to health-care professionals | Yes | 4 | 53.68 | <0.05 |
| | No | 96 | | |
| Confusion about which medicine to take and when | Yes | 4 | 53.68 | <0.05 |
| | No | 96 | | |
| Miss out doses | Yes | 9 | 40.41 | <0.05 |
| | No | 91 | | |
| Difficulty of remembering when to take medicine | Yes | 33 | 5.95 | <0.05 |
| | No | 67 | | |
| Difficulty of getting medicine out of container | Yes | 12 | | |
| | No | 22 | | |
| | Others | 1 | | |
| | Others | 65 | | |
| Difficulty of reading labels on medication packaging | Drawer | 15 | | |
| | Medicine cabinet | 28 | | |
| | Refrigerator | 17 | | |
| | No particular place | 23 | | |
| Most commonly used assisting device | Others | 17 | | |
| | Magnifying glass | 12 | | |
| | Braille pill box | 22 | | |
| | Script talk | 1 | | |
| Storage of medication | Others | 65 | | |
| | Basic medication | 43 | | |
| | Over-the-counter medication | 27 | | |
| | Prescription and nonprescription medication | 6 | | |
| Types of medication kept | Keep for future use | 35 | | |
| | Return to pharmacy | 1 | | |
| | Throw away | 31 | | |

Contd...

Table 5: Contd...

| Item | Answer | Percentage (n=100) | χ^2 | P |
|------|--|--------------------|----------|---|
| | Dispose only expired medication | 23 | | |
| | Dispose both expired and nonexpired medication | 10 | | |

#Chi-square test; $P < 0.05$

medication which are often printed in a small font. It was hard for visually impaired patients to read even with the assistance of refractive glasses.^[23] In parallel, Pey *et al.* found that nearly half of the visually impaired individuals were unable to access health information in their preferable format, and 80% of them had difficulty in identifying labels on medication.^[24]

According to the interview on current medication taken, the indication and frequency of dosage were the information that most concerned by the respondents whereas the name and expiry date of the drug were often overlooked. Loss of light perception in visually impaired population totally hinders them from identifying the medication accurately. This will probably lead to medication errors such as duplication and drug interactions. The tendency of respondents with chronic medications to take the expiry date was low as the drug supply was in continuous form and chances of having leftover medication were minimal. Having incomplete knowledge of own medication could be dangerous as respondents might not be aware of what medication they were taking and this will put them at great risk of adverse drug events. It is obviously seen that the health consciousness among respondents particularly in the aspect of medication is low. To solve this problem, patients' education with appropriate assisting device such as Braille's label is the key to success in assisting patients to manage their medication. Adherence to drug regimen is also strongly associated with patients' knowledge on drugs.^[25]

A majority of respondents have lack of understanding on the importance of maintaining medication list. An updated medication list is useful to reconfirmation with the family or friends if the medications were mixed up. Stock *et al.* revealed that systematic management of an accurate and up-to-date medication list reduced the prevalence of medication errors.^[26]

A clean and secure location should be chosen for storage of medication to avoid mixing up with other medications and maintain the optimum efficacy of the drugs. The respondents' storage preferences were often prioritized by the convenience of getting the medication such as left in a plastic bag, cupboard, or random places. Inappropriate storage might be contributed to the patients at higher risk for nonadherence. Conn recommended that patients should keep all of their medications in a specific place to prevent missed dose.^[27] The use of pill box was uncommon among the visually impaired respondents. In addition, a large proportion of respondents did

not store medication in separate containers when taking two or more medications. This was because the respondents felt troublesome to carry out the separation of medication. The practice of repacking medication is speculated to be uncommon among respondents as 99% of them did not remove drugs from original packaging.

The majority of the respondents kept unused drugs for the reuse purpose. Another reason of stockpiling was probably as a preventive measure during emergency time. This result is parallel to an assessment carried out by Thompson and Stewart with noninstitutionalized older persons.^[28] They found that almost one in five patients kept the expired medication at their home. Hoarding of unnecessary drugs is a dangerous practice which will cause wastage and errors.^[20] Basic medications such as pain killer and sore throat lozenges were the most commonly stored medications. Almost all the respondents were unsure how to dispose of their medication properly. Disposal of medication through household wastes may cause environmental pollution and lead to detrimental effects on wildlife.^[29] Hence, it is advisable to return leftover or unwanted medications to pharmacy for safe disposal.^[3] The Malaysian Environmental Quality (Scheduled Wastes) Regulation 1989 stated that unused or unwanted medications are included as scheduled waste under the category of clinical waste.^[30]

Chronic diseases such as diabetes mellitus and hypertension required patients to undergo medication review in a timely basis. Medication review can reduce the prevalence of polypharmacy and adverse drug events.^[31] This study showed that almost half of the respondents consumed medication without consulting health-care professionals. This reflected that self-medication is practicing among visually impaired individuals. This practice is discouraged as self-medicate can lead to overdose, drug interactions, and complicate the process to identify adverse drug reaction.^[20] The respondents also did not inform health-care professionals regarding difficulties encountered during medication management. This may be partly due to respondents' lack of knowledge about the pros and cons of medication review.

CONCLUSION

Self-management of medication is a demanding task for individual with compromised vision, especially those who are practicing polypharmacy. A majority of the studied visually

impaired individuals depended on themselves in handling of medication. Their use of medicine was based on their memories. The usage of assisting device was not widespread among them. Dosage forms should be designed in such a way that fits the requirement of visual defects population. The awareness and knowledge of medication management among respondents was still poor. This shows that this special population is urged for the need of improving pharmaceutical care services.

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Conflicts of interest

There are no conflicts of interest.

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