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West LM, Diack L, Cordina M, Stewart D.

A cross-sectional survey of the Maltese general public on medication wastage.

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Abstract

Background: Medication wastage is a global issue, with key public health implications in terms of safety, the environment and the economy. A recently conducted systematic review of the published literature identified a lack of focus on the views of healthcare professionals and the general public.

Objective: To explore awareness, attitudes and behaviours relating to medication wastage amongst the general public in Malta.

Setting: Malta.

Method: Survey methodology employing a pre-piloted questionnaire was developed from theoretical frameworks of behaviour. Questionnaire items comprised open, closed and 5-point Likert scales. Medication adherence as a possible factor associated with wastage was measured using the 8-item Morisky Medication Adherence Scale. Random sample of 1920 was obtained from the Maltese electoral register 2013. Ethical approval was obtained.

Main outcome measures: Awareness, attitudes and behaviours relating to medication wastage amongst the general public in Malta.

Results: Response rate was 20.4%. The majority (70.6%) agreed that they were fully aware of the issue of wastage and 71.9% disagreed that they had no interest in wastage. The following were significantly related to increased awareness of wastage: older age (p=0.003), pensioners (p=0.011), on regular medication (p=0.021) and obtaining free medication (p=0.026). Lack of interest in wastage was significantly related to obtaining free medication by government (p=0.022), with those purchasing medication being significantly more interested (p=0.028).

While 75.1% of respondents on regular medication self-reported not being fully adherent, there were no associations with awareness (p=0.100) and interest in wastage (p=0.385). Unemployed were more likely to report contribution towards wastage (p=0.010) and the presence of a healthcare professional as family member was significantly related to confidence in ability to reduce wastage (p=0.009). 46.2% claimed to have unused medication at home and improvement in patient's medical condition was the main reason for this. Conclusion: More effort is warranted to raise awareness of the public as an initial step in promoting behavioural change in relation to medication wastage.

Impact of findings on practice

- This study is an initial step in promoting behavioural change as it provides an association between the public's behaviour in relation to medication wastage and the need to raise awareness and education of the public.
- Age, occupation, whether patients are on regular medication and whether patients obtained their medication for free have a significant role when addressing awareness towards issues of medication wastage.
- Significant associations of data for demographic characteristics and awareness and interest in issues and behaviours in relation to medication wastage provide an insight on important aspects that need to be considered when developing strategies to reduce wastage.

Introduction

According to the World Health Organization (WHO) global estimates published in 2004, more than half of all medication is inappropriately prescribed, dispensed or sold with a resultant *"wastage of scarce resources and widespread health hazards"*.[1] A study

commissioned by the Department of Health (DoH) in England in 2009, which explored the scale and cost of medication wastage, concluded that direct costs of unused prescription medication to the National Health Service (NHS) amounted to £300 million annually.[2] Medication wastage is a global issue, with key public health implications in terms of safety, the environment and the economy. Despite lack of scientific evidence, the scale of medication wastage has been voiced at the highest of political levels.

While a recent systematic review of medication wastage literature identified a number of potential causes of wastage, with the main factors contributing to wastage being 'change in medication', 'patient's death', 'resolution of patient's condition' and 'passed expiry date', none of the included studies focused on the perspectives of the general public.[3] The only studies which have encompassed the perspectives of the general public on medication wastage focused on medication disposal. Cross-sectional surveys have reported medication disposal patterns and general public perceptions of the risk posed to the environment.[4-7]

Medication non-adherence contributes substantially to medication wastage. Indeed, the World Health Organisation states that globally it is estimated that half of all patients fail to take medication correctly.[8] Therefore, paying attention to medication non-adherence could positively impact medication wastage. No published studies to date have investigated the association between medication adherence and medication wastage and indicators of adherence were not designed to measure wastage.

The development of complex interventions which aim to minimise medication wastage should be based on robust evidence such as that generated through a systematic review of the published literature, followed by the development of a theoretical understanding of

behaviours and potential process of change.[9] The research presented in this paper is part of a programme of research involving: a systematic review of the literature on medication wastage[3]; a consensus based study to define and scope medication wastage[10]; and collection of data from healthcare professionals (HCPs) and the general public on their perspectives of medication wastage. The combined data will be used to develop a medication wastage reduction intervention.

Aim of the study

The aim of this study was to investigate issues of awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese general public.

Ethical approval

The study was approved by the Research Ethics Committees of the School of Pharmacy and Life Sciences, Robert Gordon University, Scotland and the University of Malta.

Method

Design

Survey methodologies are employed to predict population attributes or behaviours[11] hence and were considered most appropriate.

Setting

This study was conducted in Malta, a 316 square kilometres archipelago divided into six regions in the middle of the Mediterranean with a population of 416,110.[12] The healthcare system in Malta is based on the Beveridge 'public' model, where funding is based mainly on taxation and is distinguished from other models of healthcare by a centrally organized NHS

provided mainly by public health providers.[13] Medication in Malta is either supplied to the patient free of charge by the government, based on entitlement criteria, or against payment.

Inclusion criteria, sampling and sample size

Residents of Malta at the time of the study and aged 18 years and over were included. Participants were selected by random sampling of the Maltese electoral list 2013, obtained from the Department of Information. The total Maltese population (aged 18 years and over) from the electoral register 2013 was 332,644. Assuming a 20% response rate (with follow-up of non-respondents) required a sample size of 1,920 to achieve 384 responses to give 95% confidence intervals with a 5% margin of error.

Questionnaire

The questionnaire was developed based on existing literature[5,6,14-16]; findings of previous Delphi technique study[10] and theoretical frameworks which try to determine individuals' decisions to behave in a certain way (Health Belief Model and Transtheoretical Model of Behaviour Change). One of the theoretical frameworks used in this study, the Health Belief Model takes into account the individual's past experiences and characteristics. The other theoretical framework used is the Transtheoretical Model of Behaviour Change, which is based on stages of change and categorises segments of the population based on where they are in the process of change.[17]

The questionnaire was presented as both an English and Maltese version comprising items on awareness, interest and perceived contribution to medication wastage; current practices relating to medication purchased or obtained free of charge; and demographics. The 8-item Morisky Medication Adherence Scale (MMAS-8-Item)[18] was included to determine

adherence by those prescribed regular medication or who had a medication prescribed during the two weeks prior to the study.

Questionnaires were sent by email to a panel of ten senior colleagues and/or participants from the Delphi study[10] for face and content validity review. A pilot study using a random sample of 100 members of the Maltese general public was carried. A covering letter was included with the questionnaire describing: the purpose of the study; sampling; voluntary nature; use of data; organiser; funding body; and reminders of confidentiality.[19] The questionnaire, covering letter and a self-addressed envelope were sent by post requesting that the completed questionnaire be returned to the principal researcher within two weeks. Questionnaire data collection took place between September and November 2013.

Measures highlighted in a systematic review by Edwards *et al*.[20] to increase response rates of studies employing postal questionnaires were adopted: high quality, short, focused questionnaires with appropriate formatting; an 'invitation to participate' letter; support of a scholarship; university logos on letters and questionnaires; reassurance of confidentiality throughout; provision of reply paid envelopes for postal questionnaires; and one reminder. 'Post-it' notes stating "*Your feedback will be greatly appreciated. Thank you.*" were attached to postal questionnaires to increase further response rates.[21]

Data handling and analysis

Data were inputted into SPSS® V21 and analysed using descriptive statistics for categorical data and inferential statistics to explore any associations. Independent reliability checks were undertaken on a sample of 10% of entries. Data from Likert scales were converted to binomial data by combining all agree responses, and all disagree and unsure responses. Chi-

square was used to determine any associations between variables and outcomes. Variables identified as significant in univariate analysis were further tested in bivariate logistic regression analysis. P-values ≤ 0.05 were considered significant.

Results

Demographics

The response rate following the first mailing was 15.4% (295 responses) and increased to 20.4% (391/1,920 responses) following one reminder. Table 1 provides a description of the respondent demographics, comparing these to Maltese population demographics where available.

Insert Table 1 here.

Less than one quarter of the general public (22.7%, n=76) stated their health to be as good as it could be.

Awareness of medication wastage

Table 2 provides responses to statements on aspects of medication wastage.

Insert Table 2 here.

Association of data for demographic characteristics and binomial data from Likert scales combining all agree responses, and all disagree and unsure responses were carried out for the following statement "I am fully aware of the issue of medication wastage in Malta". The study revealed that age and awareness of medication wastage were significantly related χ^2=21.223, p=0.003,df=1. Younger respondents were much less likely to self-report awareness of issues of medication wastage.

Also, the type of occupation and awareness of medication wastage were significantly related χ^2=13.111, *p*=0.011,df=4, with pensioners more likely to self-report awareness of issues of medication wastage and students self-reporting the least.

Whether patients were on regular medication and awareness of medication wastage were significantly related χ^2=5.334, *p*=0.021,df=1. Respondents who were on regular medication were much more likely to self-report awareness of issues of medication wastage.

Whether patients were obtaining their medication for free and awareness of medication wastage were significantly related χ^2=4.962, *p*=0.026,df=1. Respondents who were obtaining their medication for free were more likely to self-report awareness of issues of medication wastage.

Variables identified as significant in univariate analysis ($p \leq 0.05$) were entered into bivariate logistic regression. There were no strong predictor(s) for the given outcome.

Interest in the issue of medication wastage

Table 3 provides responses to statements relating to interest in the impact of medication wastage.

Insert Table 3 here.

Association of data for demographic characteristics and the statement in questionnaire: "I have no interest in the issue of medication wastage in Malta", revealed that whether patients were obtaining their medication for free and no interest in medication wastage were

significantly related χ^2=5.254, *p*=0.022,df=1. Respondents who were obtaining their medication for free were more likely to self-report no interest of issue of medication wastage. It also revealed that whether patients were purchasing their medication and interest in medication wastage were significantly related χ^2=4.809, *p*=0.028, df=1. Respondents who were paying for their medication were less likely to self-report no interest of issue of medication wastage.

The fact that those patients paying for their medication were less likely to self-report no interest of issue of medication wastage is in line with the finding that those patients obtaining their medication for free were more likely to self-report no interest of issue of medication wastage. Both variables were retained as significant in bivariate logistic regression, as follows:

- medication for free, odds ratio 2.280 (95% CI 1.093-4.758)
- paying for medication, odds ratio 2.041 (95% CI 1.15-3.731)

Contribution to medication wastage

Table 4 provides responses to statements on contribution towards medication wastage in Malta.

Insert Table 4 here.

Association of data for demographic characteristics and the statement in questionnaire: "I feel that I contribute to the issue of medication wastage in Malta", revealed that the type of occupation and contribution towards medication wastage were significantly related χ^2=13.274, *p*=0.010,df=4, with unemployed respondents much more likely to report contribution towards medication wastage.

Confidence in ability to reduce medication wastage

Table 5 provides responses to statements on the ability to reduce medication wastage in Malta.

Insert Table 5 here.

Association of data for demographic characteristics and the statement in questionnaire: "I feel confident in my ability to reduce medication wastage in Malta", revealed that the presence of a HCP as a family member (dentist, doctor, nurse and/or pharmacist) of respondent and confidence in ability to reduce medication wastage were significantly related χ^2=6.807, p=0.009,df=1, with respondents who had a HCP as a family member self-reporting a higher confidence in ability to reduce medication wastage.

Medication adherence

The MMAS-8-Item was completed by those either prescribed regular medication or who had a medication prescribed during the two weeks prior to the study (n=269).

Responses to individual scale statements are given in Table 6.

Insert Table 6 here.

Three quarters (75.1%, n=202) self-reported not being fully adherent with 43.5% (n=117) reporting low adherence and 31.6% (n=85) reporting medium adherence. Only 24.9% (n=67) reported high adherence.

Current practices with medication that patients buy or get for free

Almost one-fifth of respondents (16.9%, n=52/308) strongly agreed/agreed that they bought all of their medication regularly whether or not they had run out. On the other hand, slightly more than a quarter of respondents (26.9%, n=51/190) strongly agreed/agreed that they obtained all their free medication regularly whether or not they had run out, with only 4.2% (n=8/190) of respondents strongly agreed/agreed that they obtained more free medication than needed. While 15.9% of respondents (n=49/308) strongly agreed/agreed that they passed medication that they bought for themselves to other persons, such as relatives, neighbours and friends, only 5.5% (n=17/308) accepted medication from other people. The majority of respondents (65.3%, n=124/190) felt that they were aware of the approximate costs of the medication that they obtained free of charge from the NHS.

Experiences with medication

This section had to be completed only by those respondents either taking medication every day or had been prescribed or purchased OTC medication in the previous six months (85.7%, n=335). One-fifth of respondents (21.5%, n=72) stated that they encountered a problem when trying to read the expiry date, or failed to respond. Table 7 presents responses relating to locations where respondents stored medication. More than half of respondents (56.4%, n=189) stated that they had never been given any information on medication storage.

Insert Table 7 here.

Slightly less than half of respondents (46.2%, n=155) reported to have unused medication in their household. Figure 1 depicts the reasons why this medication remained unused.

Insert Figure 1 here.

Table 8 shows the method of disposal respondents employed for unused and expired medication. Two thirds of respondents (66.6%, n=223) claimed that they had never been given this information.

Insert Table 8 here.

Discussion

This is the first study to report the perspectives of the Maltese (or indeed any) general public on medication wastage and associations between variables and outcomes of related to medication wastage. Univariate analysis identified the potential importance of age, type of occupation, whether the person was on regular medication, whether the person was using medication obtained for free, and the presence of a HCP as a family member. Age has been shown to be a significant factor in relation to awareness in other areas, such as awareness of and attitudes towards the avoidance of skin cancer,[22] awareness of early signs and symptoms and prevention of oral cancer[23] and awareness of the patients' rights by subjects on admission to a tertiary university hospital in Poland.[24] Therefore, different age groups should be targeted in different ways when implementing strategies to reduce medication wastage.

Considering the significant associations observed between respondents' occupation and outcomes of awareness of medication wastage and individual contribution towards medication wastage, it is important for healthcare policy makers and HCPs to consider occupation when targeting medication wastage reduction. Occupation has also been shown to significantly impact areas of healthcare, such as the level of satisfaction with physicians' services in primary healthcare[25] and the level of self-medication usage.[26] Occupation was also found to play a role in terms of awareness of existing medical conditions, such as the existence of hypertension.[27]

Measures to target patients on regular medication should perhaps differ to those prescribed medication acutely, as those on regular medication were much more likely to self-report awareness of issues of medication wastage. In contrast, Wan-kin Chan *et al*. argued that patients taking chronic medication generally lack knowledge of their medication, albeit not specifically relating to wastage.[28] Notably, data from the public survey failed to identify any association between the level of adherence and outcomes relating to medication wastage. However, self-reported adherence levels were sub-optimal, a result which is also important in relation to medication wastage if patient health outcomes are adversely affected. It is important for HCPs to adopt models of concordance which truly engage patients, providing opportunities for informed discussion and decision-making. Bond *et al*. argued that the goals of best outcomes and reducing medication wastage can only be achieved by significant involvement of the patient and by the provision of suitable and accessible information.[29]

Those members of the public obtaining free medication reported a lower interest in issues of medication wastage compared to those paying for their medication. The reason for this result is unknown but could perhaps be related to paying for medication engendering a greater respect in medication in general, appropriate use and minimising wastage. This finding is important in terms of national policy development and review around medication supplies, and targeting medication wastage. A study on the effect of free healthcare on polypharmacy suggested that the effects of the free healthcare system need to be fully explored and recognised before informing policy debates.[30]

Interestingly, one quarter of general public respondents had a HCP as one of their close family members (dentist, doctor, nurse or pharmacist). A statistically significant association

was observed between this family link and confidence in own ability to reduce medication wastage. One possible interpretation is due to the direct access to professional support, which should be extended to all. In general, there were clear deficiencies in terms of advice to patients by HCPs related to storage and disposal. Lack of information regading medication disposal was strongly manifested in a survey study carried out by Fenech *et al*. in the Maltese context in early 2012 which found that only 7% of Maltese respondents have ever been advised on the best way for medication disposal.[31] Fenech *et al*. found that the least common source of information was through the family doctor as opposed to the current study whereby doctors were the second most common source of information. Bestowed information vis-à-vis the safe disposal of medications altered respondents' disposal practices in a study by Wieczorkiewicz *et al*.[32] Therefore, provision of information by healthcare professionals should not be underestimated. This voices the need for more education and training in relation to this area.

The variables identified as significant provide a framework for potentially targeting medication wastage reduction strategies and are thus important for policy makers, organizations, educators and practitioners. Moreover, theories of behaviours and behavioural change employed in this research will aid the systematic development of complex interventions to support medication wastage reduction. Such an approach is in line with the recommendations of the UK MRC.[33] However, further qualitative research is required to provide more in-depth understanding to aid the development of these strategies.

There are, however, a number of weaknesses and hence the results should be interpreted with caution. The response rate was low and hence may limit the generalizability. Regardless of the number of measures taken to enhance response rates, non-respondent bias could not be

eliminated and the differences between those who responded and those who did not respond to the survey could not be established. However, the respondents were similar in terms of demographics to the general population. Relying on self-reporting meant that individuals amongst the public who were unable to read or write could not participate in this study unless helped by others, thus potentially creating a selection bias. A core weakness of this study was the lack of internal reliability and test-retest reliability testing. Moreover, while respondents appear to be similar to other populations, caution should be exercised in extrapolating the results beyond Malta in view of the differences in healthcare systems, practices and cultures.

Conclusion

The quantitative data from these cross-sectional studies have demonstrated that more effort is warranted to raise awareness and education of the public as an initial step in promoting behavioural change in relation to medication wastage. Significant associations of data for demographic characteristics and awareness of issues and behaviours in relation to medication wastage provide an insight on important aspects that need to be considered when developing strategies to reduce wastage.

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Conflict of interest

The authors declare no conflict of interest. This study formed part of the author's submission for PhD. The scholarship had no influence on study design, conduction, analysis, interpretation or writing of this article.

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Table 1: Respondent demographic data (n=391)

Characteristic	**Percent (Frequency)**	**Maltese**
	% (n)	**Demographics**
		% (n)
Gender		Electoral register 2013
Male	43.5 (170)	49.4 (164,370)
Female	56.5 (221)	50.6 (168,274)
Age (years)		Census 2011
18-24	7.2 (28)	13.3 (55,312)
25-34	13.0 (51)	14.5 (60,462)
35-44	17.1 (67)	13.0 (54,129)
45-54	15.6 (61)	13.8 (57,336)
55-64	23.5 (92)	14.3 (59,470)
65-74	13.6 (53)	(>65 years):
75-84	7.9 (31)	16.3 (67,841)
≥ 85	2.1 (8)	
Highest level of education		Census 2011
No schooling	1.0 (4)	1.6 (5,948)
Primary	17.9 (70)	20.0 (71,254)
Secondary	36.1 (141)	59.0 (209,715)
Post-secondary	18.9 (74)	5.3 (18,792)
Tertiary	17.4 (68)	9.7 (34,306)
Post-graduate	8.2 (32)	4.4 (15,689)
Missing data	0.5 (2)	-
Locality of residence		Electoral register 2013

Southern Harbour	19.4 (76)	19.8 (65,843)
Northern Harbour	31.7 (124)	28.7 (95,377)
South Eastern	15.6 (61)	14.9 (49,711)
Western	12.0 (47)	13.9 (46,292)
Northern	14.1 (55)	14.3 (47,734)
Gozo and Comino	6.9 (27)	8.3 (27,687)
Missing data	0.3 (1)	-
Labour status		2012 Maltese Demographics
Employed	47.6 (186)	48.2 (NA*)
Unemployed	6.7 (26)	3.3 (NA)
Inactive	45.7 (179)	48.5 (NA)
• Pensioner	27.6 (108)	-
• Student	3.8 (15)	-
• Other	14.3 (56)	-
Respondent or close family member is a dentist, doctor, nurse or pharmacist		
No	72.1 (282)	-
Yes	25.8 (101)	-
Missing data	2.1 (8)	-

Table 2: Awareness of medication wastage (n=391)

Statements	**Strongly disagree** % (n)	**Disagree** % (n)	**Unsure** % (n)	**Agree** % (n)	**Strongly agree** % (n)	**Missing** % (n)
I am fully aware of the issue of medication wastage in Malta	5.6 (22)	5.9 (23)	15.3 (60)	34.8 (136)	35.8 (140)	2.6 (10)
I am fully aware of the impact of medication wastage in Malta on patients	5.4 (21)	8.4 (33)	24.3 (95)	39.9 (156)	17.4 (68)	4.6 (18)
I am fully aware of the impact of medication wastage in Malta on healthcare professionals	7.2 (28)	10.7 (42)	37.6 (147)	27.6 (108)	11.0 (43)	5.9 (23)
I am fully aware of the impact of medication wastage in Malta on society	4.6 (18)	6.1 (24)	18.9 (74)	42.5 (166)	23.3 (91)	4.6 (18)
I am fully aware of the impact of medication wastage in Malta on the economy	2.3 (9)	5.4 (21)	12.5 (49)	40.4 (158)	35.8 (140)	3.6 (14)
I am fully aware of the impact of medication wastage in Malta on the environment	4.1 (16)	6.1 (24)	29.2 (114)	35.8 (140)	19.2 (75)	5.6 (22)

Table 3: Interest in the impact of medication wastage (n=391)

Statements	**Strongly disagree**	**Disagree**	**Unsure**	**Agree**	**Strongly agree**	**Missing**
	% (n)	**% (n)**	**% (n)**	**% (n)**	**% (n)**	**% (n)**
I have no interest in the issue of medication wastage in Malta	40.4 (158)	31.5 (123)	5.6 (22)	7.4 (29)	5.6 (22)	9.5 (37)
I have no interest in the impact of medication wastage in Malta on patients	37.1 (145)	36.8 (144)	9.7 (38)	6.4 (25)	2.0 (8)	7.9 (31)
I have no interest in the impact of medication wastage in Malta on healthcare professionals	32.5 (127)	36.6 (143)	13.0 (51)	5.6 (22)	2.8 (11)	9.5 (37)
I have no interest in the impact of medication wastage in Malta on society	38.6 (151)	37.1 (145)	8.2 (32)	5.6 (22)	2.3 (9)	8.2 (32)
I have no interest in the impact of medication wastage in Malta on the economy	40.9 (160)	36.6 (143)	7.7 (30)	3.8 (15)	3.3 (13)	7.7 (30)
I have no interest in the impact of medication wastage in Malta on the environment	37.6 (147)	35.3 (138)	12.5 (49)	3.8 (15)	2.6 (10)	8.2 (32)

Table 4: Contribution towards medication wastage (n=391)

Statements	**Strongly disagree**	**Disagree**	**Unsure**	**Agree**	**Strongly agree**	**Missing**
	% (n)	**% (n)**	**% (n)**	**% (n)**	**% (n)**	**% (n)**
I feel that I contribute to the issue of medication wastage in Malta	35.8 (140)	21.0 (82)	9.5 (37)	18.2 (71)	9.0 (35)	6.6 (26)
I feel that other people are contributing to the issue of medication wastage in Malta	3.6 (14)	3.6 (14)	17.9 (70)	44.0 (172)	25.3 (99)	5.6 (22)
I feel that the free health system is contributing to the issue of medication wastage in Malta	14.3 (56)	18.7 (73)	18.9 (74)	24.0 (94)	18.4 (72)	5.6 (22)
I feel that dentists are responsible for the issue of medication wastage in Malta	25.1 (98)	34.8 (136)	27.4 (107)	5.1 (20)	3.1 (12)	4.6 (18)
I feel that doctors are responsible for the issue of medication wastage in Malta	14.1 (55)	21.5 (84)	25.1 (98)	27.1 (106)	7.9 (31)	4.3 (17)
I feel that nurses are responsible for the issue of medication wastage in Malta	19.2 (75)	34.5 (135)	25.3 (99)	12.8 (50)	3.3 (13)	4.9 (19)
I feel that pharmacists are responsible for the issue of medication wastage in Malta	18.9 (74)	34.0 (133)	25.8 (101)	11.0 (43)	5.6 (22)	4.6 (18)

Table 5: Confidence in ability (n=391)

Statements	**Strongly disagree**	**Disagree**	**Unsure**	**Agree**	**Strongly agree**	**Missing**
	% (n)	**% (n)**	**% (n)**	**% (n)**	**% (n)**	**% (n)**
I feel that I could do more to reduce medication wastage in Malta	9.0 (35)	15.6 (61)	28.4 (111)	29.4 (115)	9.2 (36)	8.4 (33)
I feel confident in my ability to reduce medication wastage in Malta	6.4 (25)	12.5 (49)	37.1 (145)	24.3 (95)	11.3 (44)	8.4 (33)
Dentists could do more to reduce medication wastage in Malta	6.6 (26)	16.9 (66)	48.3 (189)	15.9 (62)	3.8 (15)	8.4 (33)
Doctors could do more to reduce medication wastage in Malta	3.1 (12)	6.9 (27)	19.7 (77)	43.7 (171)	18.4 (72)	8.2 (32)
Nurses could do more to reduce medication wastage in Malta	5.9 (23)	14.1 (55)	30.7 (120)	32.7 (128)	7.7 (30)	9.0 (35)
Pharmacists could do more to reduce medication wastage in Malta	4.9 (19)	13.3 (52)	25.8 (101)	35.8 (140)	11.0 (43)	9.2 (36)

The state could do more to reduce medication wastage in Malta	1.5 (6)	3.8 (15)	13.8 (54)	36.8 (144)	34.5 (135)	9.5 (37)

Table 6: Responses to MMAS-8-Item (n=269)

MMAS-8-Item	**Yes % (n)**
Do you sometimes forget to take your pills?	50.6 (136)
People sometimes miss taking their medication for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?	26.4 (71)
Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	19.0 (51)
When you travel or leave home, do you sometimes forget to bring along your medication?	18.6 (50)
Did you take your medicine yesterday?	85.9 (231)
When you feel like your health is under control, do you sometimes stop taking your medicine?	22.3 (60)
Taking medication everyday is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	31.2 (84)
How often do you have difficulty remembering to take all your medication?	
Never/Rarely	47.2 (127)
Once in a while	38.7 (104)

Sometimes	11.5 (31)
Usually	2.2 (6)
All the time	0.4 (1)

Table 7: Medication storage (n=335)

Storage location	**Percent (%)**	**Frequency**
Medication cabinets in kitchen	30.7	103
Medication cabinets in bedroom	18.5	62
Medication cabinets in bathroom	28.4	95
Medication cabinets in garage	0.9	3
Cupboard in kitchen	30.7	103
Cupboard in bedroom	14.0	47
Cupboard in bathroom	12.5	42
Cupboard in garage	0.9	3
Office	3.6	12
Car	2.4	8
Fridge	26.6	89
Carried around by individual	13.7	46
Other	9.2	31
Missing data	7.2	24

Table 8: Methods of medication disposal used by respondents (n=335)

Disposal of medication	**Unused**	**Expired**
	% (n)	**% (n)**
Throw them away with the household rubbish	5.1 (17)	46.6 (156)
Throw them down the toilet or sink	6.6 (22)	33.7 (113)
Give them to a pharmacy to give them to someone else	14.9 (50)	1.2 (4)
Give them to another person or friend	9.6 (32)	1.2 (4)
Take them to a medication disposal bring-in-site	2.7 (9)	6.6 (22)
Give them to a pharmacy to dispose of them	8.4 (28)	8.1 (27)
Keep them for possible future use	57.3 (192)	3.3 (11)
Sell these medication	0.0 (0)	0.0 (0)
Give to charity	2.1 (7)	0.6 (2)
None of the above	0.0 (0)	0.0 (0)
I do not know	2.1 (7)	3.0 (10)
Other	8.1 (27)	3.6 (12)
Missing data	9.0 (30)	9.2 (31)

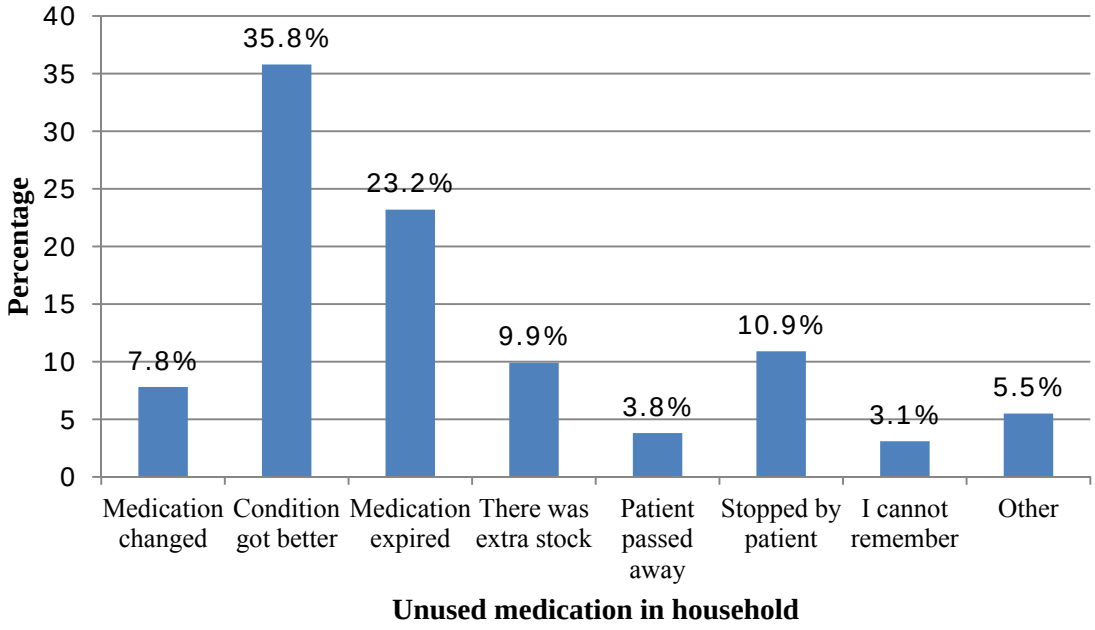

Figure 1: Reasons for unused medication (n=335)