

Full Length Research Paper

Assessing the complexity of medicine regimens – A pilot study

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Complexity of medication regimens may adversely affect adherence and treatment outcome. The aim of this study was to assess the complexity of medication regimens. In this retrospective study, complexity of the medication regimens for outpatients was assessed using the medication regimen complexity index (MRCI). The correlation between medication complexity and the parameters of age, gender, underlying disorder and the number of medications were determined. Significant parameters impact on medication complexity were found to be age and number of medications. Therefore older patients, as well as patients taking several medications, should be monitored for compliance and adherence must be emphasized.

Key words: Medication, complexity, adherence, treatment, regimens.

INTRODUCTION

For medication therapy to be effective, it requires adherence to a prescribed regimen. A patient's ability to adhere to a regimen can be influenced by various factors, one of which is the complexity of the regimen. Complexity, as reflected by the number of prescribed drugs, represents an important correlate of treatment outcome, as more complex regimens will ultimately impact on adherence and therapeutic efficacy. The results of several studies have shown that, as medication regimen complexity increases, adherence declines (Chesney et al., 2000; Dilorio et al., 2003; Eldred et al., 1998; Hinkin et al., 2002; Paterson et al., 2000).

Medication complexity used to be measured by the number of medications and the number of times per day the medication was taken (Dilorio et al., 1991; Graveley and Oseasohn, 1991). Assessing medication complexity based only on the number of drugs, however, misses intrinsic complexity related to the structure of therapy (Corsonello et al., 2009). When patients are taking more than one type of medication, taking different doses of the

same drug at different times, or having to perform some mechanical action such as breaking a tablet when taking medication, the complexity of the medication regimen increases. Complexity therefore, also includes special instructions with regards to medication (for example, take at a separate time than other medications), additional directions (for example, taking the medication with food) and mechanical actions (for example, splitting a tablet in half) necessary to take the medications (Kelly, 1988). Complexity of medication regimens may also result in medication errors – the more complex a regimen is to follow, the easier it would be for a patient to err when taking medication. Poor adherence, as well as medication errors, is a serious concern for health practitioners. It often leads to increased resource utilization, owing to a reduction in effectiveness and associated increase in the risk of therapeutic failure.

The aim of this study was to assess the complexity of medication regimens for patients in a public hospital, using the Medication regimen complexity index (MRCI) which is a tool used to assess medication complexity (George et al., 2004).

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METHODOLOGY

Abbreviations: MRCI, Medication regimen complexity index.

Ethical clearance for this study was obtained from the University of

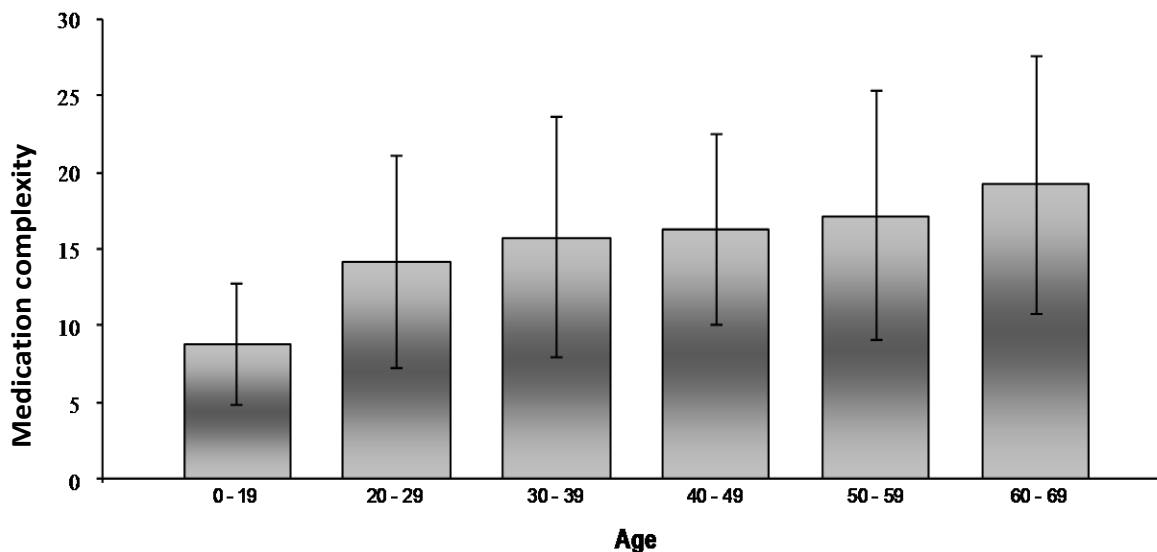


Figure 1. The influence of age on medication complexity.

KwaZulu-Natal and the KwaZulu-Natal Department of Health. This retrospective study was conducted at a public hospital in KZN. 200 scripts were obtained from the outpatient dispensary for inclusion in the study. Scripts were randomly chosen by selecting every fifth script dispensed over a 1 week period, in a systematic manner. Patient confidentiality was maintained as data was transcribed using a coding system.

Medication complexity of the 200 randomly chosen scripts was determined using the MRCI developed by George et al. (2004). The MRCI comprises of three sections:

- (1) Nature of dosing forms, that is, whether it is a tablet/ inhaler/ gel.
- (2) Dosing frequency, that is, how often the medication is taken.
- (3) Additional directions that need to be followed, that is, take before or after a meal/ at a specific time/ breaking the tablet in half.

All entries on the MRCI were based on information from the 200 scripts reviewed. If a script contained more than one medication, the MRCI was completed for each different medication. The MRCI is an open-ended index, thus there would be no limit to the total number of medications that could be included on the MRCI.

The following factors were considered when scoring the complexity:

1. The number of medications in the regimen (each individual medication receives a score of one);
2. The number of doses per day (each dose receives a score of one, thus a medicine taken tds will be allocated a score of 3);
3. The additional directions that must be followed, including take as needed, take with meals, take before meals, take after meals, no dairy products (each additional instruction receives a score of one)
4. The mechanical actions necessary to administer the medications including alternating doses, eye drops, inhalation, injections, ointments/creams, paste/patch, measure, mix powder, etc. (each mechanical instruction receives a score of one).

The total MRCI score for each of the 200 scripts were calculated by adding scores from each of the three sections. The higher the score obtained, the higher the complexity of a specific medication regimen.

Patient demographics, including age and gender, as well as underlying disorder, were included when comparing the complexity of different scripts.

Data was analyzed using SPSS (Statistical programme for Social Sciences version 15.1). Chi-square tests were used to compare gender, age, underlying conditions and the number of medications.

RESULTS AND DISCUSSION

A total of 200 scripts were analysed to determine complexity of the prescribed medication regimens.

Gender

Female patients accounted for 68, 5% of the sample population while male patients accounted for 31.5% of the sample population. While it seemed that the average MRCI scores were higher in females (17.27 ± 7.8) than in males (15.43 ± 7.772), this was not statistically significant ($p \geq 0.5$) and could probably be ascribed to a larger percentage of females in the study sample.

Age

A trend observed in this study was that complexity of medication regimens in the older age groups was higher than in younger patients (Figure 1). The youngest age group (0 to 19 years) recorded the lowest average MRCI score (8.83 ± 3.971) whereas the age group 60 to 69 years recorded the highest average MRCI score (19.28 ± 8.452). A similar observation was made in a study by Acurcio et al. (2009), where it was found that elderly

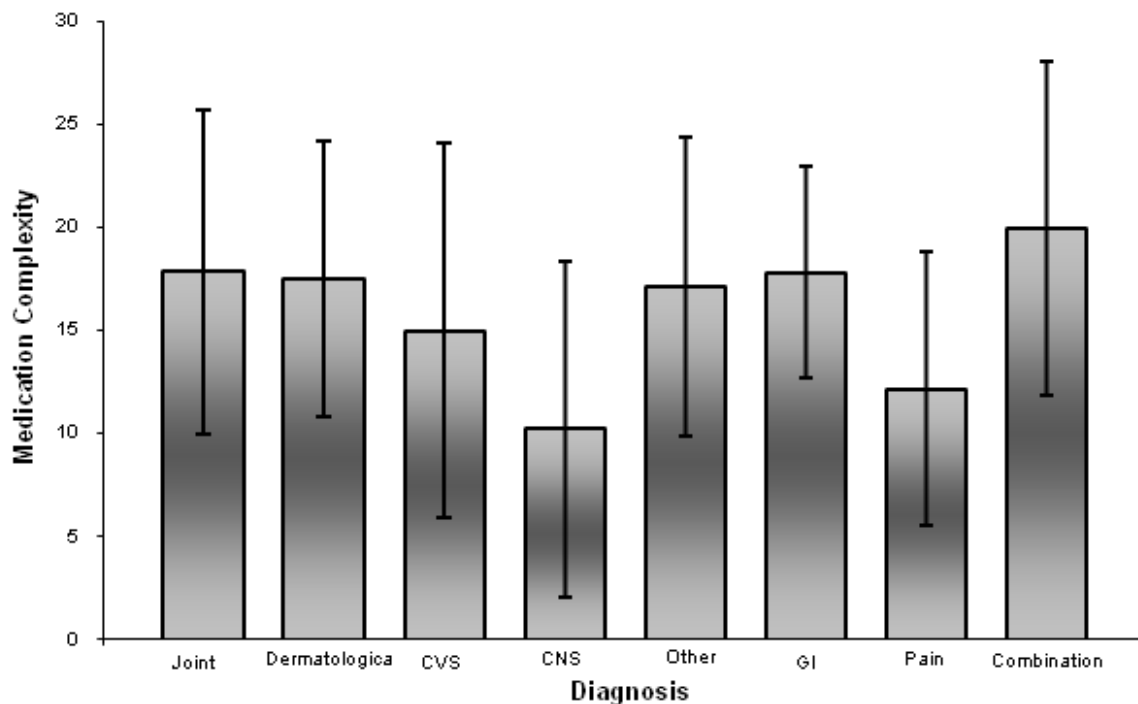


Figure 2. The influence of disease condition on medication complexity.

people seem to receive more complex treatment regimens when compared to younger patients.

Number of medication items on a prescription

The number of medication items in a treatment regimen affected the complexity of a treatment regimen significantly. In patients receiving between 1 and 5 different types of medication, the complexity score was 13.89 ± 5.593 while in patients taking between 6 to 10 different types of medication concurrently, the complexity score was nearly doubled at 26.93 ± 6.061 ($p < 0.0001$).

Disease condition

This study further aimed to determine if the type of disease condition impacted on the complexity score of medication regimens.

The following disease conditions were identified in this study:

1. Joint conditions, for example, arthritis;
2. Dermatological conditions, for example, psoriasis.
3. Cardiovascular conditions, for example, hypertension;
4. Central nervous system conditions, for example, epilepsy;
5. GIT conditions, for example, diarrhea;
6. Pain;

7. Co-morbidity, for example, when a patient has been diagnosed with two or more conditions affecting different physiological systems, for example, hypertension and epilepsy;

8. Other conditions not included in the above classification.

No significant trends were observed when comparing the different types of disease conditions on medication complexity (Figure 2). This may be attributed to the sample size of each condition. An interesting observation made in this study was that a combination of disease conditions did not significantly increase the complexity of the medication regimen when compared to a single disease condition.

Conclusion

MRCI is a useful tool to make pharmacists aware of patients who might have complex medication regimens and potentially experience difficulty in taking their medication as instructed.

This study evaluated medication complexity in patients of different age, gender, patients taking different medications at once, as well as patients with different underlying conditions. Medication complexity was found to be higher in patients on a number of medications, as well as amongst older patients.

Literature emphasizes medication complexity as a

factor likely to impact negatively on patient compliance, and ultimately, treatment efficacy (Acurio et al., 2009).

According to Gray et al. (2009), simplification of therapy could aid self-care among the elderly and dosing regimens should therefore be simplified to promote adherence. While the primary goal should be to minimize the regimen complexity, it is not always possible to do so, and in these cases options should be made available to provide useful alternatives to patients. These include practical devices including pill boxes, alarms to serve as reminders, pill planners etc. and simple advice such as setting aside specific times to take medication so that it becomes a routine.

Health care providers should thus pay specific attention to older patients, as well as patients on more different types of medication, as adherence to more complex treatment regimens necessitates greater monitoring.

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