

# Evaluation of a Patient Education Program for Solid Organ Transplant Patients

Nilufar Partovi, Winnie Chan and Cindy Reesor Nimmo

## ABSTRACT

*Medication counselling of transplant patients plays a major role in the outcome of the transplant. The medication counselling program at Vancouver Hospital and Health Sciences Centre for Solid Organ Transplant (SOT) patients consists of verbal counselling by a pharmacist, provision of medication teaching sheets, and patient participation in the self-medication program. The objectives of this study were to evaluate the effectiveness of the medication counselling program for SOT patients and to develop a series of tests to serve as a teaching tool.*

*Solid organ transplant patients who were English speaking and tolerated oral medications were enrolled in the study. A prospective evaluation of the medication counselling program was done through a series of identical tests. Percent scores were calculated for each test, and pre-test scores (scores prior to counselling) were compared to post-test scores (scores after counselling).*

*Twenty-eight SOT patients participated in the study. Patients scored an average of 25% on the pre-test prior to the counselling session and 66% on the post-test at the time of discharge. When scores on specific questions were compared, patients did well on drug identification, dosage and indications, but poorly on questions regarding side effects.*

*Patient counselling improves medication knowledge in SOT patients as indicated by an increase in test scores. The combination of repeated counselling sessions and the participation in the self-medication program reinforces medication knowledge and maximizes retention of knowledge.*

**Key words:** patient education, self-medication, solid organ transplant

## RÉSUMÉ

*Le counselling pharmacothérapeutique auprès des patients ayant subi une greffe d'organe joue un rôle clé dans le succès de la transplantation. Le programme de counselling pharmacothérapeutique du Vancouver Hospital and Health Sciences Centre vise ces patients et comprend: des conseils verbaux donnés par un pharmacien, la distribution de feuilles d'information sur les médicaments ainsi que la participation du patient au programme d'auto-médication. Les objectifs de l'étude visaient à évaluer l'efficacité du programme de counselling pharmacothérapeutique chez ces patients et à élaborer une série de tests devant servir d'outils didactiques.*

*Seuls les patients qui avaient subi une greffe d'organe, qui étaient de langue anglaise et qui toléraient les médicaments pris par voie orale ont pu participer à l'étude. Une évaluation prospective du programme de counselling pharmacothérapeutique a été effectuée au moyen d'une série de tests identiques. Les résultats en pourcentage ont été calculés pour chaque test, et les résultats préalables (c.-à-d. avant le counselling) ont été comparés aux résultats post-tests (c.-à-d. après le counselling).*

*En tout, 28 personnes ont participé à l'étude. Les résultats moyens étaient de 25 % avant la période de counselling et de 66 % après la période de counselling, après avoir obtenu leur congé. La comparaison des résultats pour des questions spécifiques a révélé que les patients ont bien réussi au plan de l'identification des médicaments, de la posologie et des indications, mais moins bien au plan des effets indésirables.*

*Le counselling améliore les connaissances pharmacothérapeutiques des patients ayant subi une greffe d'organe, comme en font foi les résultats plus élevés notés après une séance de counselling. Les patients qui ont eu des séances répétées de counselling et qui ont participé à des programmes d'auto-médication ont une meilleure connaissance pharmacothérapeutique et une meilleure capacité de rétention de ces connaissances.*

**Mots clés :** auto-médication, éducation des patients, transplantation d'organes pleins

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## INTRODUCTION

Patient medication counselling is an important component of patient care. Medication counselling can increase patient knowledge of medications, improve compliance, and decrease the need for re-hospitalization.<sup>1,2</sup> Education of solid organ transplant (SOT) patients has been identified as influencing the outcome of the transplant.<sup>3-5</sup> The adherence to the prescribed medication program is essential for SOT patients since small deviations from the prescribed regimen could result in graft loss or death. Common methods of patient education include verbal counselling by a health professional, written medication information, self-medication programs, and educational videos.<sup>1,2,6</sup> The combination of verbal and written information has been shown to increase patient medication knowledge and recall of information compared to either method used alone.<sup>1,2,7</sup> Self-medication programs have also been shown to improve patient medication knowledge and post-discharge medication compliance.<sup>1,8,9</sup>

The solid organ transplant program at the Vancouver Hospital and Health Sciences Centre (VHHSC) consists of kidney, kidney-pancreas, heart, liver, lung, and heart-lung transplants. Approximately 120 solid organ transplants are performed each year. The medication counselling program for SOT patients is provided by the Pharmacy Department and consists of verbal counselling, distribution of medication teaching sheets, and a self-medication program. The impact of patient counselling and the self-medication program on medication knowledge of SOT patients has not been assessed at our institution. An evaluation of our patient education program was undertaken to determine its impact on SOT patients and to identify areas which require improvement. The primary objective of this study was to evaluate the effectiveness of the medication

counselling program for SOT patients. The secondary objective was to develop a series of tests which could be used as a teaching tool and allow individualization of patient education.

## METHODS

Patients undergoing solid organ transplantation at VHHSC between March 1993 and June 1993 were assessed for enrolment into the study. The inclusion criteria for the study were: 1) ability to tolerate oral medications for at least one day; 2) ability to read English; 3) mental ability to understand medication information as assessed by the transplant team; and 4) willingness to participate in the study.

The prospective evaluation of the medication counselling program for SOT patients was done through a series of four identical tests (pre-test, and post-test 1 to 3). Each test consisted of a general information section plus a maximum of five drug specific sections. The same drug questions were used in each test provided the patient continued to receive the drug.

A general information section was developed to assess knowledge applicable to the use of any medication (Appendix A). Drug specific sections were developed for the most commonly prescribed oral medications in SOT patients and included acyclovir, azathioprine, co-trimoxazole, cyclosporine, fluconazole, nifedipine, prednisone, and ranitidine. The drug specific questions were designed to assess the patient's knowledge and their dosage regimen and information on the medication teaching sheets (Appendix B). Each question was assigned a point value of one or two depending on the level of importance. Recognition of the drug as well as knowledge of the prescribed dosage were considered the two most important answers and were assigned a point value of two. The total number of medications and number of central nervous system (CNS) depressant medications were recorded for each

patient during the pre-test and each post-test.

Each patient was counselled and assessed according to the following time schedule. Baseline knowledge was assessed within two days after the start of oral medications with pre-test (Appendix A). The pre-test was followed by a counselling session which involved verbal teaching and provision of medication teaching sheets (Appendix B). The medication teaching sheets have been developed by the department of pharmacy at our hospital. The pharmacy department utilizes different references such as USPDI, Drug Information Facts, and other available sources in developing medication teaching sheets. Each teaching sheet is reviewed by two pharmacists and sent for external review, usually by a physician. The reading level for medication teaching sheets is determined to be for grade six or seven. Patients were encouraged to ask questions throughout the counselling session. Post-test 1 was conducted two to three days following the counselling session. Patients then entered the self-medication program which occurred within one to two days after post-test 1. The patient took his/her medications at the scheduled times and marked them off on his/her own medication administration record (MAR) under nursing supervision. Regularly scheduled medications were kept at the patient's bedside. Post-test 2 was performed three to five days after initiation of the self-medication program. Post-test 3 was performed five to seven days after post-test 2 either in the hospital or in the SOT Outpatient Clinic.

The study counselling sessions and tests were conducted by pharmacists only, while other health professionals were involved in the routine education of the study patients. Patient counselling and the medication knowledge assessment were performed by four pharmacists. Each patient was counselled and tested by no more than two pharmacists. During

the three post-tests, the pharmacist reviewed any incorrect answers with the patient.

Pre-test percentage scores were compared to post-test scores to determine the impact of the counselling session. Scores on post-tests 1, 2 and 3 were also compared to each other to assess retention of information. Scores for each drug section as well as individual questions were analyzed to determine the specific areas requiring improvement. Patient demographics were compared to test scores. The data were collected and analyzed using a commercial data base program (dBase IV®, Ashton-Tate) and Statistical Package for Social Sciences-PC, Version 2.0 (SPSS-PCV2.0® (SPSS Inc.)). Parametric data were compared using paired students-t test with significance set at  $p < 0.05$ .

## RESULTS

Twenty-eight SOT patients participated in the study and completed all four assessments. Table I describes patient demographics. All of the patients were first-time transplant recipients. Extra renal transplant types included heart, liver, lung, and kidney/pancreas. Patient's education levels ranged from grade school to post-graduate university degrees. The majority of the patients (25/28) had occupations that were not health-related. The three patients who held jobs in the health care field consisted of a pharmacist, a nurse, and a medical office assistant. When the influence of demographic factors on pre-test scores and test score differences were analyzed, only the type of occupation was found to influence pre-test scores ( $p < 0.02$ ). None of the demographic factors were found to affect the improvement in test scores.

The average percent changes in total test scores are shown in Table II. All differences were statistically significant. A gradual cumulative increase in total test scores after each post-test was seen. There was a larger

**Table I. Patient Demographic Information**

Number of patients	28
Average age, yrs(range)	47.2
Male(%) Female(%)	12 (43%) 16 (57%)
Transplant type(%) renal extra renal	15 (54%) 13 (46%)
Language(%) fluent in English non-fluent	24 (86%) 4 (14%)
Education(%) < high school high school college university post-graduate	5 (18%) 6 (21%) 11 (40%) 5 (18%) 1 (3%)
Occupation(%) medical/health related other	3 (10%) 25 (90%)

**Table II. Comparative Total Test Results**

	% change pre-test to post-test 1	% change pre-test to post-test 2	% change pre-test to post-test 3	% change post-test 1 to post-test 2	% change post-test 2 to post-test 3
<b>Average*</b>	24.8	36.7	40.9	11.9	4.21
<b>Range</b>	6-77	6-84	6-90	32-84	39-90
<b>Standard deviation</b>	10.6	11.8	12.7	9.7	8.9

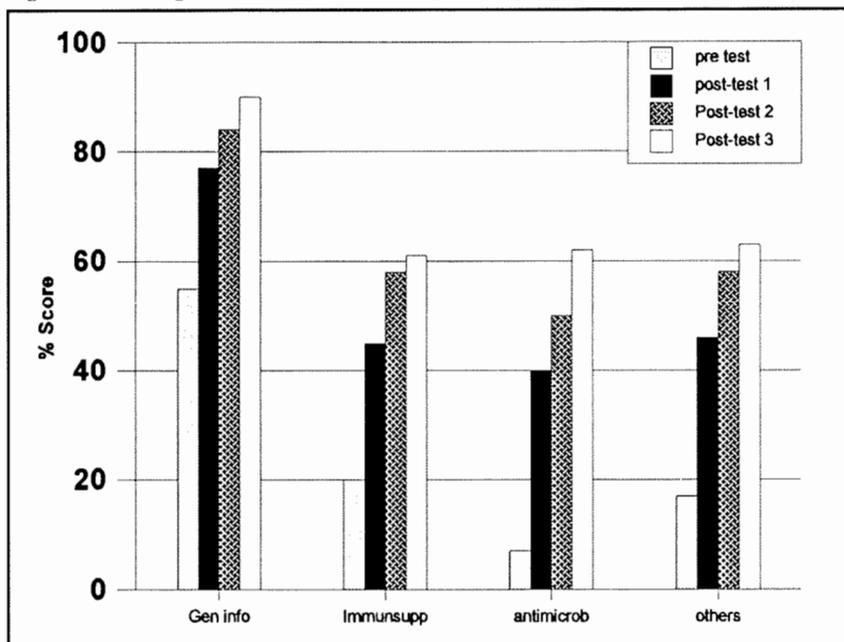
\*All average % changes were statistically significant ( $P < 0.05$ )

percent increase in scores between pre-test and post-test 1 than between post-tests 1 and 2, and post-tests 2 and 3.

The patients were tested on an average of 4.5 medications but received an average of ten oral medications concomitantly. The average daily number of central nervous system depressant medications was 1.5 at the time of the pre-test, and 0.4 at the time of post-test 3. The most common CNS depressant medications taken by these patients were dimenhydrinate, Tylenol No. 3® (acetaminophen with codeine), anileridine, and morphine. These medications were found to have a significant influence on pre-test scores ( $P < 0.05$ ).

Test results were further analyzed with respect to medication category (Figure 1) and question type (Figure 2). There was an improvement in scores for all medication categories and all four question types. Overall, the patients scored best on the general information questions and scored similarly among the other medication categories. The percent increase in subsequent post-test scores was similar for all medication categories. For the question types, the largest increase was seen with drug administration (79% difference between the pre-test and post-test 3). The patients scored well on identification, administration and indication questions; however, scores on questions regarding side effects were all below 50%.

Figure 1. Average Percent Score According to Drug Categories



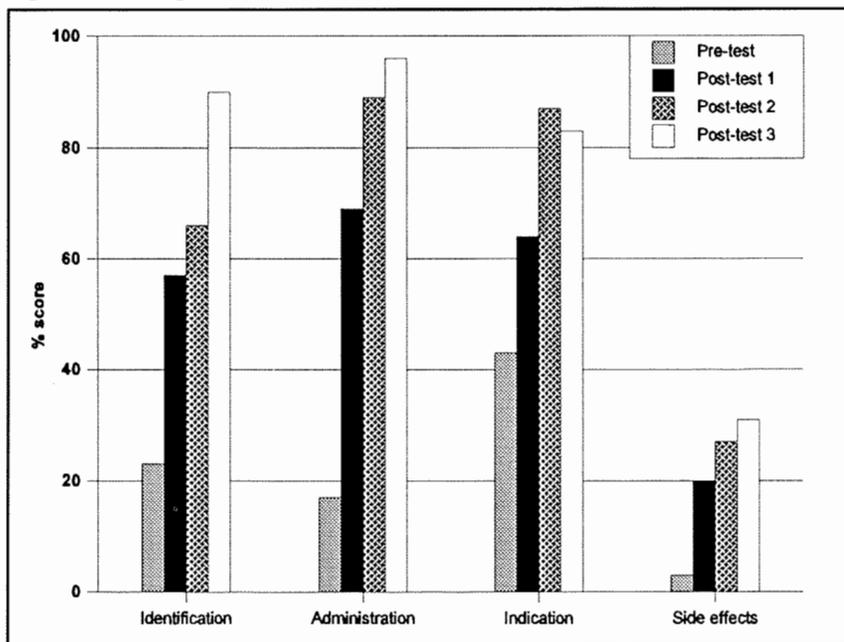
Gen info = general information (scores from general information drug questionnaire)

Immunosupp = immunosuppressants (azathioprine, cyclosporine, prednisone)

Antimicrob = Antimicrobials (acyclovir, co-trimoxazole, fluconazole)

Others = nifedipine, ranitidine

Figure 2. Average Percent Score According to Question Types



## DISCUSSION

It has been recognized that medication noncompliance contributes greatly to graft rejection among organ transplant patients.<sup>4,5</sup> A medication noncompliance rate of 15% to 27% has been

reported among organ transplant recipients.<sup>4,5</sup> Education, reinforcement, and a simplified medication regimen have been identified as key factors in improving medication compliance.<sup>4,5</sup> The goal of patient

medication counselling is to improve compliance by maximizing the proper use of medications. Our study demonstrates that patient medication counselling and participation in a self-medication program improve medication knowledge in organ transplant patients. Patients had minimal knowledge about their medications prior to the counselling as indicated by the low average score on the pre-test. The average test score improved after medication counselling was provided as seen in post-test 1. Participation in the self-medication program helped the patients to further improve test scores and was assessed by post-test 2. The larger percent change observed between the pre-test and post-test 1 than among subsequent post-tests supports the literature finding that verbal counselling and written information has a large impact on medication knowledge<sup>1,2,7</sup>. The further increase in test score post discharge as shown by post-test 3 relative to post-education scores, demonstrated the retention of knowledge for the study period.

There are several limitations to our study. First, only short-term knowledge retention was assessed. The testing period ranged between 14 to 21 days. The impact of medication counselling and the self-medication program on long-term knowledge retention remains unknown. In order to assess the long-term knowledge retention in SOT patients, post-education tests should be given at least one month after discharge. Second, the quality of teaching was inconsistent since four pharmacists were involved in the counselling and testing. Each pharmacist is varied in motivation and ability to teach, therefore, the improvement in test scores may be related to the ability of the pharmacist to conduct the counselling and testing sessions. It was not possible to have one pharmacist conduct the entire study due to rotating shifts at our hospital. Third, the motivation levels of the

patients varied which may also have affected improvement in post-test scores.

The influence of demographic factors on baseline knowledge and subsequent test scores was examined. Demographic factors such as age, sex, transplant type, and education did not significantly influence test scores. The lack of correlation of these variables may indicate that the pharmacists individualized their teaching according to patient needs. All patients were, therefore, able to understand and retain the information presented to them. Patient occupation appeared to affect baseline knowledge. Patients who had health related jobs were more familiar with drug names, identification and indications and, thus, scored higher.

The number of central nervous system (CNS) depressant medications influenced baseline knowledge. CNS depressants lowered test performance because they decreased the patient's ability to concentrate. As most SOT patients are prescribed CNS depressants while in hospital, pharmacists need to be aware when conducting counselling sessions. The total number of drugs patients were taking did not influence the test scores.

A variety of scores were achieved among the drug categories (Figure 1). Patients had a good knowledge base on general information questions. However, comparatively lower scores were achieved on questions regarding immunosuppressives, antimicrobials, and other drugs. This finding suggests that extra counselling should be given on specific medications in future counselling sessions.

Different scores were also achieved on the various question types (Figure

2). In general, patients scored well on drug identification, administration and indication questions at the time of discharge (post-test 3). Scores on side effect questions remained low. A reason may be that there are usually four or more side effects for each drug and it is difficult to remember all of them. Another reason may be that some of the uncommon side effects listed on the medication teaching sheets were discussed only briefly during counselling sessions. A recommendation for the future would be to emphasize the important side effects during counselling sessions.

The dramatic increase in scores on drug identification and administration reflects the impact of the self-medication program. The self-medication program allowed the patients to administer the correct drug at the correct times on their own under nursing supervision. Self-medication programs are of benefit to the patient because they increase the patient's knowledge of medications,<sup>1,8,9</sup> and encourage responsibility in medication self-administration.<sup>9-11</sup> This increases the patient's independence,<sup>8,10,11</sup> and promotes compliance in medication administration after discharge from the hospital.<sup>8,9</sup>

The questionnaires developed for this study served two purposes. The first purpose was to assess patient medication knowledge, and the second was to serve as a teaching tool for future counselling sessions. These questionnaires helped to identify the areas of deficiency for each patient. Recognition of these areas could assist pharmacists to individualize each teaching session in the future.

In conclusion, our study demonstrated that the medication counselling program significantly improved medication knowledge in SOT patients. The gradual cumulative increase in total test scores after repeated counselling sessions and a self-medication program demonstrates an increase in medication knowledge as well as retention of knowledge. This increase in medication knowledge should contribute positively to the therapeutic outcome of solid organ transplant patients.

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### Appendix A: Sample of pre- and post-tests

#### General Information Section:

#### MARK

1. Where should you store your medications?
  - (1) \_\_\_\_\_ in a cool place OR at room temperature
  - (1) \_\_\_\_\_ dry place (not the bathroom)
2. What type of container should you store your medications in?
  - (1) \_\_\_\_\_ original package OR a tightly closed container
3. What should you do if you forget to take a dose of any of your medications?
  - (1) \_\_\_\_\_ take the missed dose as soon as possible
  - (1) \_\_\_\_\_ if it is within two hours of the next dose, skip the missed dose
4. What should you do before taking any other medications, either prescription or non-prescription?
  - (1) \_\_\_\_\_ check with a pharmacist OR a physician
5. What would happen if you stopped taking your anti-rejection medications?
  - (1) \_\_\_\_\_ risk of rejection of transplanted organ
6. Why is it important for you to keep your regular appointments with the transplant clinic following your discharge from the hospital?
  - (1) \_\_\_\_\_ to monitor blood levels
  - (1) \_\_\_\_\_ to monitor for signs of medication toxicity
  - (1) \_\_\_\_\_ to monitor for organ rejection
7. Why should you tell your dentist that you are on anti-rejection therapy?
  - (1) \_\_\_\_\_ due to increased risk of infection

Total Mark out of 11: \_\_\_\_\_

#### Drug Specific Section: CYCLOSPORINE

#### MARK

1. What is this drug called? (show patient sample of the drug)
  - (2) \_\_\_\_\_ cyclosporine OR Sandimmune
2. What is it used for?
  - (1) \_\_\_\_\_ to prevent organ rejection
3. What is your dose?
  - (1) \_\_\_\_\_ Dose:
4. When do you take it?
  - (1) \_\_\_\_\_ Times:
5. What side effects can occur with cyclosporine?
  - (1) \_\_\_\_\_ infection
    - \*Can you do anything to prevent infections?
      - (1) \_\_\_\_\_ avoid people who have an obvious cold OR flu
      - (1) \_\_\_\_\_ gum tenderness OR swelling OR bleeding
        - \*Can you do anything to prevent this?
          - (1) \_\_\_\_\_ brush teeth well OR maintain good oral hygiene, OR see dentist regularly
          - (1) \_\_\_\_\_ high blood pressure
          - (1) \_\_\_\_\_ fine hand tremor
          - (1) \_\_\_\_\_ increase in fine body hair
6. How long do you think that you will have to take cyclosporine?
  - (1) \_\_\_\_\_ for the life of the transplant OR the rest of my (patient's) life
7. How does your doctor monitor the dose of cyclosporine?
  - (1) \_\_\_\_\_ by measuring the blood level of cyclosporine

Total Mark out of 14: \_\_\_\_\_

**Appendix B**  
**Medication Teaching Sheet for Cyclosporine**

**ANTI-REJECTION MEDICATION**

**Name: CYCLOSPORINE**  
(also known as Sandimmune)

**WHAT IS IT FOR?**

- Used to prevent rejection of organ transplants and to treat graft versus host disease after bone marrow transplant.
- Also used to treat certain immune system disorders.

**HOW DO YOU TAKE IT?**

- Take at the same time each day.
- If taking the solution, store the solution at room temperature away from heat and direct sunlight. Open only one bottle at a time, and once opened, date the bottle and do not use contents after 2 months.
- If taking the capsules, keep capsules in their blister packaging and store at room temperature.

**MISSED DOSE:**

- If you forget to take a dose, take the missed dose as soon as you remember. If it is within 2 hours of your next dose,

skip the missed dose and go back to your regular dosing schedule. DO NOT double the dose. Make a note of the time and date of the missed dose and inform the transplant clinic on your next visit.

**SIDE EFFECTS:**

- High blood pressure
- Infection
- Gum tenderness
- Mild hand tremors
- Increased fine hair growth on body

**SPECIAL INFORMATION:**

- Do not take cyclosporine in the morning of having your blood drawn at the clinic. Take your dose **after** having your bloodwork done.
- Do not stop taking this medication suddenly without your doctor's approval.

**WHEN TO CALL:**

- Call your doctor if any side effects become bothersome or don't go away.

**HELPFUL HINTS FOR THE SAFE USE OF MEDICATION**

- Always let your doctor or dentist know if you are allergic to any medication. 
- If you are pregnant or planning to become pregnant, or are breastfeeding, let your doctor know. 
- Know the reasons you are taking a medication when you are to take it, and how to take it. A medication administration chart from pharmacy is helpful in monitoring your medication use. 
- Follow the directions which are provided on the pharmacy label exactly. 
- Take the medication until your doctor tells you to stop. 
- Many medications should not be taken with other medicines or with alcoholic beverages. Follow your doctor's and pharmacist's directions. 
- Keep your medication in the original container, and do not mix different medications in one container. 
- Store your medication properly. Generally it should be kept in a cool, dry cupboard. Do not store medication in the bathroom, near the kitchen sink, or in other damp places. Refrigerate medication only when specified. 
- Check the medication's expiry date label. Do not take or save old medication. 
- Always inform your doctor of any intolerable side effects before you decide to stop taking your medication. 
- In general, it is best to take oral medication with a full glass of water. Follow your doctor's or pharmacist's directions as some medications should be taken with food while others should be taken on an empty stomach. 
- Never take medication prescribed for someone else even though your symptoms may appear to be the same. This could delay proper treatment. 
- Never give your medication to anyone else. 
- Keep all medication out of reach of children. In the event of accidental poisoning, call the local Poison Control Centre. 
- Always tell your doctor and dentist what you are taking, either non-prescription or prescription medications. 
- When travelling always carry an adequate supply of your medication. 
- If you want more information about your medication, ask your doctor, pharmacist or nurse. 