Adaptive Equipment Used in the Rehabilitation of Hip Arthroplasty Patients

(joint replacement, occupational therapy, program evaluation)

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The surgical techniques of total hip and total surface replacement provide patients with hip disease either complete or significant pain relief and associated increases in range of motion. As a consequence, the patient's functional level usually increases after a postoperative recuperative phase (1, 2).

Most surgical protocols limit motion in the hip for a defined period after surgery to reduce the risk of dislocation and to improve fixation of the prosthesis. The University of California, Los Angeles (UCLA),

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Division of Orthopedic Surgery protocol for total hip replacement (THR) and total surface replacement (TSR) surgeries imposes the following motion limitations for approximately 3 months after surgery: the patients may not flex the hip past 90°, adduct the leg past midline, externally rotate the leg, or bear full weight on the leg.

Although the majority of patients will be able to return to better than former levels of activity after the 3-month period, the post-operative restrictions make it difficult for them to accomplish many of their essential activities of daily living (ADL) independently during this period and may impose additional financial and psychological stresses on the patients and their families as a consequence. In addition, many patients have secondary chronic problems associated with rheumatic diseases and orthopedic conditions that may further diminish their level of independence.

Since 1976, the UCLA Occupational Therapy Division has provided post-surgical rehabilitation to more than 600 THR/TSR patients. Helping the patient achieve independence in essential ADL by the time of discharge from the hospital (usually 2 weeks) while still observing the surgical protocol limitations has been the goal of the program. This enables the patient to maintain a maximum functional level in basic ADL during the recuperative period. The program is completed in two treatment sessions for the majority of patients and consists of patient instruction in the use of selected items of adaptive equipment, in activities of daily living, and in environmental modifications.

The objectives of this paper are to review the occupational therapy program for hip arthroplasty patients and to share the results of a retrospective survey examining the program's efficacy.

**Occupational Therapy Program**

The program consists of two sessions. The first session occurs 1-to-4 days after surgery. Timing depends upon patient receptiveness to the program, which is largely a function of the speed of physical recovery from the stresses of surgery. The second session begins after physical therapy has progressed sufficiently to allow the patient to sit in a chair, usually 5-to-7 days after surgery.

**Session I.** When this session begins the patient is still confined to bed in leg-immobilizing slings, except for limited periods of physical therapy. At this initial contact, the program is explained, the patient is evaluated, the goals are set, and the patient is given an extended handle reacher.

Using lay terminology and demonstration, the therapist also explains the motion limitations imposed by the surgical protocol, and the Five Basic Rules.

1. DO NOT bend forward from your waist more than 90°.
2. DO NOT lift your knee on the surgery side higher than your hip.
3. DO NOT bring the leg past the midline of your body.
4. DO NOT rotate your leg outward.
5. DO NOT bear full weight on the leg.

Rules 1 and 2 deal with hip flexion. We have observed that patients do not always equate forward flexion of the trunk with hip flexion; therefore, this precaution for hip flexion is doubly stressed.

After the introduction, the therapist guides the patient through the Joint Replacement Evaluation, which includes the following information:

1. Gross physical and range of motion evaluation to determine the baseline status and any secondary problems that may complicate therapy. (If chronic problems are identified, the therapist usually arranges for re-evaluation and referral to therapy after the 3-month period.)
2. Activities of daily living assess-
ment to determine: a. The living situation—type of home, any barriers to access, and availability of family/significant others post-discharge; b. Vocational and household responsibilities; c. Level of independence before surgery in the areas of bathing or showering, dressing (particularly lower extremity), and transportation; d. Present use of equipment; and e. Individual questions or problems regarding surgery, treatment, or discharge.

From this information the occupational therapist and the patient together establish a projected level of functional independence after discharge. Patients sometimes indicate that they choose to be assisted in activities after discharge in spite of the fact that they could be independent or independent with equipment. In this instance, they are encouraged toward some level of independence, but post-discharge goals are adjusted accordingly if someone is available to help the patient, particularly if the problem is of short duration and related only to the hip surgery. At this time the therapist also ascertains possible associated concerns of the patient that indicate the need for psychiatric services, social services, or discharge planners.

At the conclusion of this first session the patient is given an information sheet that includes the five basic rules, and information about assistive devices to review before the second session. The extended handle reacher is then issued to the patient. The reacher enables the patient to adjust bedcovers and to obtain objects beyond arms’ reach without assistance and without moving the leg into contraindicated positions.

Session II. The second session deals with training in the perfor-
mance of basic functional activities that are limited by the hip surgery—for example, personal hygiene, bathing, and dressing. The patient is instructed in certain modified techniques of ADL and in the use of adaptive equipment identified in the first session as appropriate for the patient's needs. The aims are to extend the patient's reach and compensate for the decreased range of motion. For example, at 5-to-7 days after surgery, each patient is given a "high chair" to use in the hospital and either continued use of the chair or appropriate cushions for other chairs for use after discharge is taught. At this same time patients are also given raised toilet seats for use in the hospital and after discharge. Plastic portable toilet seats are available. They cannot be clamped to the toilet bowl and tend to be unstable, thus they are usually not recommended.

Tub benches allow patients to be independent in bathing in spite of imposed range of motion limitations; and, in addition, patients are frequently given long-handled bath sponges and hand-held shower extensions to make bathing easier. Those patients who prefer showers are taught to use a high shower seat and may also use a long-handled bath sponge and a hand-held shower extension.

Patients find an extended handle reacher, stocking cone, and long-handled shoe horn valuable in dressing. Also, elastic shoe laces can be used to convert laced shoes into loafers. A variety of devices may be attached to walkers and crutches to assist patients in carrying items; however, crutch bags should be used with caution since they can unbalance the patient when filled.

Methods for accomplishing activities of daily living frequently need to be adapted to the individual. Techniques commonly taught are: stooping to reach an object by extending the leg backward, and using the nonimpaired knee and ankle motion to compensate for lack of hip flexion.

**Patient Survey**

A patient survey was undertaken 3 years after the program was begun to determine the program's effectiveness. Questionnaires were sent to 163 of the 180 patients who received total hip and total surface replacements during 1978. The 17 patients not included in the study either lived in a foreign country or their charts were not available—in one instance, the patient was deceased.

Of the 163 questionnaires sent, 112 (69%) were returned within the designated time limit. The primary diagnosis of patient respondents was
degenerative joint disease (51 patients, or 46%). Other diagnoses were rheumatoid arthritis, osteonecrosis, systemic lupus erythematosus, or other associated orthopedic and rheumatic disease problems. The age range was 16 to 81 years, with the mean age 53 years and the median age 57 years. Of the patients responding, 26 percent reported that they lived alone; 74 percent, the majority, lived with others. Housewives represented 22 percent, employed persons including students totaled 49 percent, and retired persons were 29 percent of the patient population.

Since one objective in the patient's evaluation was to determine the minimal adaptive equipment essential for independence after discharge, the patients were asked to indicate whether or not they used the equipment furnished in the hospital regardless of frequency of use. The responses for the specific items ranged from 88 to 99 percent use (see Figure 1).

Frequency of use of the adaptive equipment is indicated in Figure 2. The number of patients responding for each item is indicated in parentheses on the ordinate. The descending scale of always, frequently, seldom, and never, rather than a numerical scale, was chosen to determine the frequency the adaptive equipment was used. Individual differences in the life styles and activity level of patients after surgery were major determinants in this choice. For example, individual social, personal hygiene, and toileting habits would make it impossible to draw conclusions about the frequency the adaptive equipment was used based only on the numbers of times used over a given period. In addition, normal use varied widely among the pieces of equipment; for example, elastic laces, which may always be used, although shoes may be put on and removed only once a day, versus a reacher for which frequent use could mean ten times a day.

The graph indicates that for each piece of equipment the largest percentage of respondents always used the adaptive equipment, fewer indicated frequent use, and seldom used had the smallest representation of the three frequencies where the equipment was used.

Figure 3 illustrates responses concerning the duration of equipment use. At the time of the study, a 2-month precautionary period was observed by the patients. After 2 months, use of adaptive equipment was no longer required if the patient could accomplish activities independently without pain. The surgery protocol now dictates a 3-month precautionary period.
The largest percentages of duration of use are shown at the 2-month, 3-month, and the greater than 3-month use periods. The peak at the 2-month period is expected since this was the arbitrary time at which the total hip precautions were waived. However, the high 3-month and longer use probably reflects one or a combination of the following possibilities: 1. that the patient had other functional limitations related to chronic disease that were not relieved by the hip arthroplasty; 2. that optimal or task-specific functional range of motion was not obtained in the hip after surgery; or 3. that the use of the equipment had become a habit that the patient did not wish to break.

Figure 4 represents the perception of the most useful piece of equipment. Not surprisingly, the raised toilet seat and the reacher ranked highest here. They were given to the largest number of patients (Figure 2) and they were the most frequently used items (Figure 1).

Figures 5, 6, and 7 deal with the patient's perceived level of independence at three states post-surgery—discharge, 2 months, and greater than 2 months. The areas represented are the six general areas included in the survey: dressing, bathing, personal hygiene, car transfers, household, and vocational activities. Although bathing is usually considered part of personal hygiene, concerns for safety in this potentially dangerous activity dictated placing it in a separate category.

Figure 5 represents independence at discharge. For the purposes of this study, patients were considered "independent" whether or not they used equipment to achieve this independence. The patients who indicated they were in the independent category (without equipment) had been taught modified ADL techniques since they usually had no impairment in areas other than their hips. Thus, 57, 48, 72, and 48 percent of patients were independent in dressing, bathing, personal hygiene, and car transfers, respectively, at discharge.

In an attempt to identify additional problems, questions regarding both household and vocational areas were included in the survey, even though these areas were not a focus in the program. Independence in these areas seemed to correlate closely with independence in other ADL activities and no need for routine therapeutic intervention was identified.

Figure 6 represents the perceived independence level at 2-months post-discharge. This is the time at which the patient could discontinue the use of adaptive equipment if they comfortably accomplished tasks without it. As expected, the percentage of patients who were independent increased. However, the patients ranking themselves as independent with equipment also increased. This may be caused by the shift to this category of patients who had required assistance. There was an obvious decrease in patients requiring assistance and a less striking decrease in patients who were in the unable category.

Figure 7 represents the respondents' present independence level, from more than 2 months to 1 year after discharge. The majority of the patients who discontinued the use of adaptive equipment. However, a range of 7-to-14 percent of the patients continued to use the various pieces of adaptive equipment (with some patients this was 7-months post-discharge). Four to 10 percent continued to need assistance. In the unable category, 2 percent were unable to bathe, 1 percent unable to do their own housework, and 15 percent had not yet returned to their previous vocations.

Conclusions
The information derived from follow-up survey supported the following conclusions: a majority of the patients did use their adaptive equipment after discharge, which implies that the evaluation procedure used before issuing the equipment was appropriate and accurate. Furthermore, the high use of equipment indicates that the patients were compliant with the surgical protocol limitations. The largest percentage of patients used the adaptive equipment always when performing tasks and used the equipment for 2 months or longer. In addition, through the use of either modified ADL techniques or the use of adaptive equipment, a majority of the patients were independent at discharge, which was the major goal of the occupational therapy program.

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REFERENCES

Note: Copy of the forms for the Joint Replacement Evaluation and precautions may be obtained by sending a self-addressed envelope to the authors.