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THE EFFECTS OF PERFORMANCE FEEDBACK ON THE SAFETY OF CLIENT LIFTING AND TRANSFER

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Individual written and verbal performance feedback was examined to determine its influence on the safety with which physically disabled clients were transferred. Two client-transfer techniques were task analyzed and six direct service providers' on-the-job performance was measured weekly. A multiple baseline across settings and subjects was used to evaluate effects of the feedback. Consumer satisfaction and the costs of the procedures were also assessed. Results showed that feedback was consistently followed by improvements in safe performance. These improvements tended to maintain as feedback was faded. Participants favorably rated the feedback procedure and consistently recommended its use with other staff.

DESCRIPTORS: feedback, prevention, safety, staff management, task analysis

Occupational injuries pose a substantial problem in human service organizations, particularly those providing care to physically handicapped clients. According to the U.S. Department of Health and Human Services (National Institute for Occupational Safety and Health [NIOSH], 1981), human service industries account for the highest proportion of overexertion injuries reported by American industries. Of the injuries reported by health care workers, 62% are categorized as overexertion injuries; most of these are presumably incurred during the lifting and transferring of physically disabled clients (NIOSH, 1981).

According to the National Safety Council (*Accident Facts,* 1984), hospitals report a higher incidence of lost work day injuries than the average for all American industries. In addition to the costs of medical and rehabilitative services and lost wages, unsafe work practices threaten the quality of services provided to clients. Clearly, further research is needed to elaborate effective management systems for improving the safe performance of work activities by human service staff.

Efforts to prevent occupational lifting injuries extend across multiple disciplines. Engineering and ergonomic research (e.g., Snook, 1978) seeks to improve the safe design of work environments and to reduce employee exposure to hazards in the work place. Biomechanical analyses (e.g., Keyserling, Herrin, Chaffin, Armstrong, & Foss, 1980) are conducted to better match employees to specific job tasks. Employees can be trained in safe lifting techniques through one or more of the following types of antecedent control: instruction, audiovisual presentations, and simulated practice. Although educational approaches are often included in programs to prevent occupational lifting injuries, no controlled studies have demonstrated a reduction in lifting accidents or injury rate as a result of training (NIOSH, 1981). Furthermore, Komaki, Collins, and Penn (1982) cautioned against selecting only antecedent control procedures to improve performance and reported that consequent control procedures, i.e., feedback, were markedly more effective in improving the safety of employee performance.

This study was designed to systematically rep-

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Reprints and additional information on the observational system are available from Mark Alavosius, Department of Psychology, University of Massachusetts, Amherst, Massachusetts 01003.

Table 1
Task Analyses of Lifting/Transfer Procedures

	Total-lift transfer	Stand-pivot transfer
1	Positions wheelchair near goal. Ninety degree angle is best.	Positions wheelchair near goal. Ninety degree pivot is best.
2	Explanation to client.	Explanation to client.
3	Locks wheelchair brakes.	Locks wheelchair brakes.
4	Removes tray.	Moves footrests aside, calf pads aside.
5	Removes armrest.	Removes adaptive devices and seatbelts.
6	Removes seatbelt and other adaptive equipment.	Stands directly in front of client.
7	Stands at side of chair, at client's hip angle.	Spaces feet (width of hips) for balance.
8	Spaces feet (width of hips) for balance.	Bends knees, maintains straight spine.
9	Bends knees, maintains straight spine.	Prompts client forward on seat to edge.
10	Slides client forward on seat.	Prompts client to lean forward.
11	Places one arm beneath client's arms and shoulders.	Grasps client by belt, waistband or waist.
12	Places other arm beneath client's thighs.	Hugs client.
13	Hugs client.	Instructs client ("1-2-3, stand").
14	Lifts straight up by unbending knees with smooth movement.	Stands with client by unbending knees.
15	Pivots and aligns client with new surface.	Pivots with client and aligns with new surface.
16	Bends knees, lowers client to new surface.	Bends knees, lowers client to new surface.
17	Securely positions client on new surface, then releases.	Securely positions client on new surface, then releases.
18	Fastens seatbelts, restores adaptive equipment (where appropriate).	Fastens seatbelts, restores adaptive equipment (where appropriate).

licate previous feedback research (e.g., Panyon, Boozer, & Morris, 1970; Sulzer-Azaroff & de Santamaria, 1980) and to test the viability of feedback as a strategy to improve the safety with which caregivers lift and transfer physically disabled clients.

METHOD

Subjects and Setting

Six direct care staff members working in a state residential school for the mentally retarded served as subjects. Their ages ranged from 20 to 43 years, and experience in their current assignment ranged from 8 months to 4 years.

The facility's infirmary unit, serving clients with multiple physical handicaps and severe ambulation problems, was the setting for this study. Analysis of the facility's accident report data, generated during the year preceding this study, indicated that 35 (55%) of the injuries incurred while transferring clients occurred in this unit.

The cottage and wards selected for study were staffed on three shifts, providing round-the-clock care to residents. First and second shifts (6:45 a.m. to 3:00 p.m. and 2:45 p.m. to 11:00 p.m.) generated the majority of accident reports and were targeted for the study.

Research Staff

An experimenter and four undergraduate students conducted the employee observations. The students were informed of the purpose of the study, but were naive to the intervention and the schedule of feedback. Members of the facility's staff contributed significantly to this project. The Director of Physical Therapy, Unit Director of the Infirmary, Director of Staff Development, and physical therapists and aides assisted in the identification of unsafe transfer practices and development of the observation system. Infirmary supervisors assisted with the performance feedback.

Materials

Checklists containing task analyses of lifting/transfer techniques were used to assess employees' on-the-job performance. Standardized memoranda from the experimenter to each subject provided

written feedback on designated practices. A videotape containing demonstrations of both safe and unsafe transfer techniques was used to train observers to record subjects' performance to an 85% level of agreement. A questionnaire assessing participants' satisfaction with the procedures was administered at the conclusion of the feedback phase.

Observational System

Based on the facility's in-service training materials, consultation with the Director of Physical Therapy, and a review of relevant manual-lifting literature (Chaffin & Ayoub, 1975; Karhu, Kansi, & Kuorinka, 1977; NIOSH, 1981) two client-transfer techniques were task analyzed into detailed sequences of 18 component steps (see Table 1). These task analyses specified the steps involved in preparing a client and surfaces for safe transfer, the body position and posture of the employee during the lift, and the procedures to lift, position, and secure the client on the new surface (for a more complete description of the observational system, checklists, and discussion of the stability of measurement of task components, see Alavosius & Sulzer-Azaroff, 1985). Observation of actual transfers indicated that these techniques were frequently used in the experimental settings.

Interobserver agreement. Simultaneous and independent observations were conducted periodically throughout the study with each observer. Agreement was defined as both observers scoring a task component as "safe," "unsafe," or "not applicable." Occurrence, nonoccurrence, and overall agreement indices were calculated by dividing the number of agreements by the number of agreements plus disagreements, then multiplying by 100.

During data collection, over 250 client transfers were assessed using the checklists. Fifty-two agreement checks were made during these observations. Twenty-nine checks were completed under baseline conditions, 17 during the intervention, and 6 during follow-up observations. Agreement on occurrence of safe practices averaged 91.6% (55%–100%); agreement on nonoccurrence averaged 84.2% (0%–100%). The overall mean percent agreement was 88.89% (72%–100%).

Procedures

Baseline. Prior to the start of the project, each subject was asked to provide her work schedule and to indicate the times during her shift when she was most likely to transfer clients. Observers were then scheduled to visit the work site twice per week to observe and score transfers. Observers were instructed to observe discreetly and avoid calling undue attention to themselves during data collection. Subjects were asked not to request feedback from the observers and were encouraged to direct any questions or concerns to the experimenter. During baseline, one subject (S.6) received orientation training in safe transfer technique by one of the facility's physical therapists. This unanticipated event, indicated by an asterisk in Figure 1, provided a single opportunity to assess the effects of training on the safety of client transfers.

Performance feedback. Written and verbal feedback was provided to each subject by a residential manager and/or the experimenter. Following observations, the safety ratings of these transfers were summarized by the experimenter using a standardized written format. Transfers were divided into four basic sections: (a) positioning of wheelchair and preparation of client; (b) staff posture and body position; (c) the lift and transfer; and (d) lowering and repositioning the client. Specific comments describing how safely each of these sections was performed during preceding observations were noted as well as specific suggestions for improvement. The written feedback also included a count of the number of observed transfers on which the feedback was based and approval of increasingly safe technique when appropriate.

Feedback was provided approximately weekly to each subject. Variation in this schedule was the result of employee absences during vacations, holidays, and sick time, as well as a 3-week absence of observers midway through the study.

The initial feedback summarized all baseline observations. During the initial feedback session, the experimenter and residential manager visited the employee at her work site and briefly explained the feedback system. The employee was then provided with the feedback form and asked to review

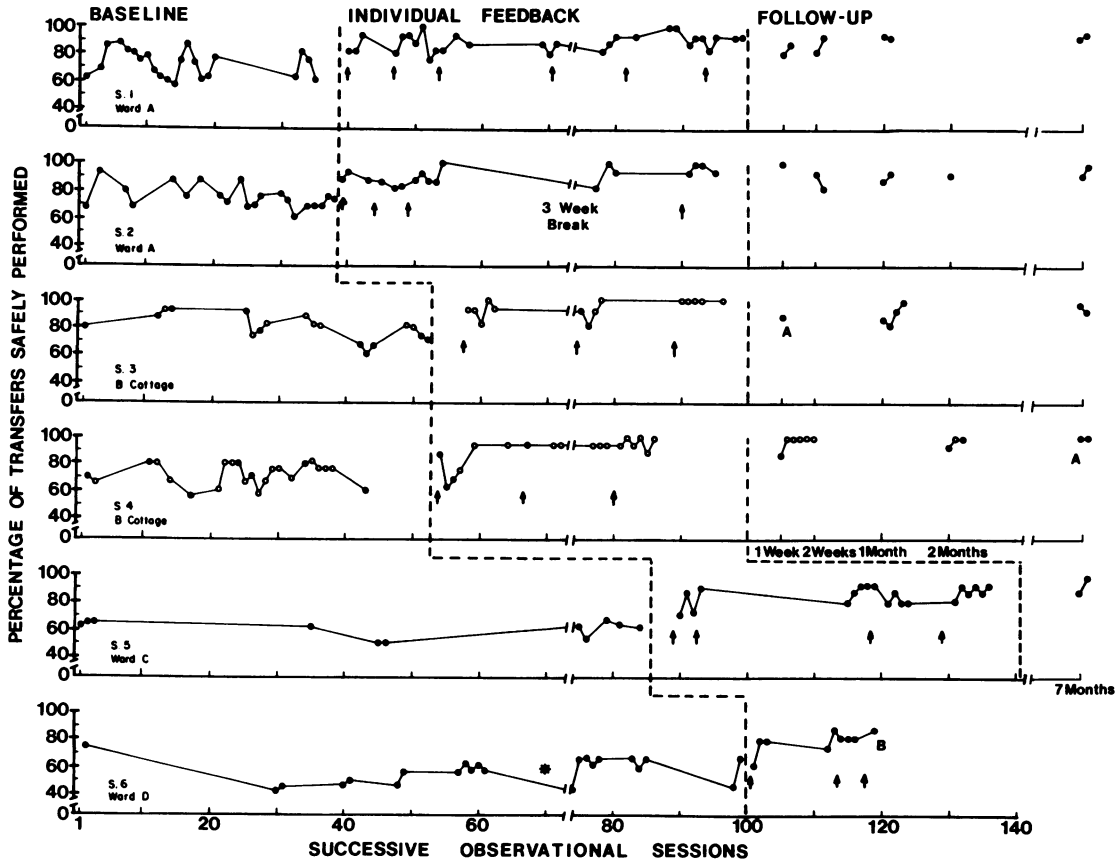

Figure 1. Percentage of transfers safely performed by each subject during baseline, feedback, and follow-up conditions. Closed circles show total-lift transfers; open circles show stand-pivot transfers. Arrows indicate delivery of feedback. "A" indicates reassignment of S.3 and S.4 to a new setting (Ward A). The asterisk indicates training in safe technique for S.6. "B" indicates reassignment of S.6 to a new setting in which client transfers were not required.

it. Following this review, the subject, manager, and experimenter briefly discussed the feedback contents. Observation of safe technique was acknowledged and praised. These initial feedback sessions lasted approximately 10 minutes.

Subsequent feedback messages were delivered to each subject, after approximately five observations, by either a residential manager or the experimenter. The subject was given the feedback form and informed that it was based on the most recent observations. The recipient was asked to read the form at her earliest convenience, and a brief positive summary of the contents was voiced (e.g., "Your transfers are improved over last week" or "Your transfers continue to be very safe").

Five subjects remained in the study through the conclusion of the feedback condition; one transferred to another unit 4 weeks after entering the feedback condition and withdrew from the study. Provision of feedback continued with the others until consistently safe transfers were demonstrated (90% of transfers scored as safe for five consecutive observations). When subjects met this criterion, acknowledgement was noted in the feedback and the individual was advised that the feedback would now end.

Follow-up. Following conclusion of the feedback condition, each subject was asked to permit periodic follow-up observations. All agreed, and probes were conducted approximately 1 week, 2 weeks, 1 month, 2 months, and 7 months after conclusion of feedback to evaluate the maintenance

Table 2

The Mean Percentage of Each Transfer Component Performed Safely

Technique	Condition	Component Number																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Total-lift	Baseline	51	64	89	100	82	100	95	88	26	83.5	91	90	66	31	48	9	97	100
	Feedback	82.5	98	97	100	95	99.5	100	98	64	99	100	97	100	59	80.5	22	100	100
Stand-pivot	Baseline	57.5	100	100	100	100	100	100	42.5	97.5	100	58.5	95	92.5	48.5	37.5	7.5	100	100
	Feedback	100	100	100	100	100	96	100	98	100	100	98	100	98	100	93	54	100	100

of safe performance. No feedback was provided following these probes.

During the follow-up period, the subjects were given a questionnaire asking their opinion of the procedures. They were provided stamped self-addressed envelopes and were asked to mail their responses to the experimenter. All five subjects did so.

RESULTS

Figure 1 shows the safe performance of targeted transfers by each subject during baseline, feedback, and follow-up conditions. The delivery of feedback and the occurrence of unanticipated events are also shown on this figure. Performance tended to be variable during baseline. Following initial feedback messages, the safety of all subjects' performance improved, although variability in technique persisted. With additional feedback, safety further improved and perfect, or near perfect, technique was shown by five subjects. As noted earlier, S.6 transferred to another unit 1 month after entering the feedback phase. Her performance under the feedback condition improved but did not reach the level of consistently safe performance demonstrated by the others. Safe transfer technique was demonstrated during follow-up observations of the five remaining subjects assessed during maintenance probes.

Table 2 shows the mean safety ratings of specific transfer components performed during baseline and feedback conditions. The data indicate that seven total-lift transfer components (numbers 1, 2, 9, 13, 14, 15, and 16) were often performed unsafely during baseline as these components were scored "safe" during less than 75% of observations. Similarly, six stand-pivot transfer components (numbers 1, 8, 11, 14, 15, and 16) were frequently performed unsafely during baseline. Following feedback, the safe performance of nearly all transfer components either improved or remained at high levels. After feedback, only three total-lift components (numbers 9, 14, and 16) and one stand-pivot component (number 16) were scored as "safe" during less than 75% of observations.

Subjects' responses to the feedback evaluation questionnaire were positive; all agreed that the feedback improved the safety of their transfers and recommended the procedures for use with their coworkers.

DISCUSSION

Feedback effectively increased the safety with which physically disabled clients were lifted and transferred. Observed improvements included arranging the immediate environment for safer transfers, positioning clients and surfaces for shorter and closer transfers, removing obstacles, and stabilizing wheelchairs by locking their brakes. Additionally, employees stood in line with, and close to, the client's center of gravity. While lifting and lowering clients, caregivers tended to bend their knees and maintain an erect, straight spine. Employees pivoted with clients when aligning with new surfaces, and avoided unstable twisting movements. The quality of these transfer techniques became more consistent over time.

As the transfer techniques stabilized, clients also appeared to respond in a more relaxed manner. After feedback was withdrawn, high performance levels were maintained. Perhaps this was due, as subjects reported, to reduced effort required by the safer transfer techniques.

These results are consistent with previous research (e.g., Panyon et al., 1970; Sulzer-Azaroff & de Santamaria, 1980), which found feedback effective in enhancing caregiver performance and worker safety. As most studies of training have shown (e.g., Komaki et al., 1982; Quilitch, 1975), behavior change does not tend to endure in the absence of support systems such as feedback. Indeed, with the one subject in this study, S.6, who received in-service training in safe technique, performance changed only minimally (see data points subsequent to session 70).

A noteworthy aspect of this study was that feedback was delivered privately rather than publicly, as often is the case, yet the results were comparable to public circumstances. Generality across feedback methods can be inferred from the results of this study and the few others (Ford, 1980; Repp & Deitz, 1979) that found privately delivered feedback effective in changing behavior.

This feedback method is probably highly cost-effective. Following the 80 hours to develop the task analyses and observational system, only 13 hours per week were required to operate the system. Given that, as of 1982, the average cost of a disabling injury is $14,000 (*Accident Facts,* 1982), prevention of disabling injuries would more than offset the costs of this program.

Areas suggested for further research include analysis of the generality of this procedure to other lifting tasks, to other populations (e.g., nonvolunteers, parents and families of physically disabled individuals) and from other sources of feedback (e.g., peers, supervisors). Accelerated schedules of feedback for more rapidly establishing safe practice and the resultant endurance of behavior change might also be studied.

We made no attempt to evaluate changes in occupational injury rate as a consequence of this procedure. Given the small sample size of subjects, detectable changes in injury rate were not anticipated. Further research should evaluate application of this procedure to larger populations and assess changes in injury rate as a consequence of enhanced safe practice.

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