JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2009, **42,** 551–561 NUMBER 3 (FALL 2009)

PREVENTING BACK INJURIES IN HOSPITAL SETTINGS: THE EFFECTS OF VIDEO MODELING ON SAFE PATIENT LIFTING BY NURSES

DON NIELSEN

WESTERN MICHIGAN UNIVERSITY

SIGURDUR O. SIGURDSSON

UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

AND

JOHN AUSTIN

WESTERN MICHIGAN UNIVERSITY

This study evaluated video scoring and feedback about scoring as a safety intervention among 6 nursing staff. The dependent variable was safety behavior on one-person transfers. Following baseline, 5 nursing staff participated in an information phase. A video scoring phase was then introduced for all 6. A feedback phase was added for 2 participants. All participants experienced treatment withdrawal. Information resulted in improvements for all 5 participants who received it. Further improvements were observed during video scoring for the 5 participants who improved following information. No improvements were observed for the participant who received only video scoring. Safety feedback further improved safety for the 2 participants who received it. However, participants' behavior returned to video scoring levels during withdrawal.

DESCRIPTORS: behavioral safety, lifting, musculoskeletal disorders, nurse injuries, video modeling

---

Back injuries are a subset of musculoskeletal disorders (MSD), defined as soft-tissue injuries or disorders of the muscles, nerves, tendons, joints, cartilage, or spinal discs (U.S. Occupational Safety and Health Administration [OSHA], 2004). According to the Bureau of Labor Statistics (2009), there were 235,960 lost-work-time cases of back injury in the U.S. in 2007. The National Safety Council (2002) reported that the national average cost of a lower back injury was $11,903 per case in 2000 across all industries, and one fourth of all worker compensation claims involve back injury. In fact, according to OSHA, back injuries represent the nation's number one workplace safety problem.

Behavioral safety is an approach that applies the principles of organizational behavior management (OBM) to achieve reductions in workplace injuries. The typical behavioral intervention in the domain of safety includes identifying critical behaviors that affect safety, defining these behaviors well enough to measure them reliably, developing behavior checklists, implementing measurement systems to determine the current status of behaviors, and the encouragement (often through goal setting, feedback, and reinforcement) of desirable behaviors that reduce risk of injury and improve worker safety (Geller, 1996; Sulzer-Azaroff & Austin, 2000).

Behavioral safety interventions have been successfully implemented with a variety of worker populations, including roofers (Austin, Kessler, Riccobono, & Bailey, 1996), bus

Address correspondence to Sigurdur Oli Sigurdsson, Department of Psychology University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, Maryland 21250 (e-mail: sos@umbc.edu).

doi: 10.1901/jaba.2009.42-551

drivers (Olson & Austin, 2001), industrial plant workers (Sulzer-Azaroff, Loafman, Merante, & Hlavacek, 1990), and pizza deliverers (Ludwig, Biggs, Wagner, & Geller, 2001; Ludwig & Geller, 2001). In a meta-analysis of 73 applications in a wide variety of industries, Krause, Seymour, and Sloat (1999) reported a 20% to 25% year-over-year decrease in injuries for the first 5 years after implementing a behavioral approach to safety. Further, Sulzer-Azaroff and Austin (2000) found that 32 of 33 behavioral safety research studies reported decreases in injury rates.

Although studies investigating the effects of feedback on work performance abound in the OBM literature (Nolan, Jarema, & Austin, 1999), modeling remains a fairly underanalyzed intervention component. For example, modeling can involve showing a video of the desired behavior or behaviors and using videotape, DVD, or a similar medium for participants to imitate. Video modeling has an advantage over using a live model in terms of cost effectiveness, and, once recorded, the video format is available for learners at any time.

Video modeling has been used in a variety of settings (e.g., Charlop & Milstein, 1989; Cuvo & Klatt, 1992; Hitchcock, Prater, & Dowrick, 2004). For example, Alvero and Austin (2004) conducted a behavioral safety study in a simulated office setting that incorporated video modeling elements. During an observation phase, participants viewed and scored 5-min videotapes of an experimental confederate performing tasks similar to those the participant performed during each session. The investigators reported substantial improvements in safety behavior following observation. The method used by Alvero and Austin has several advantages in application, including the efficiency of allowing employees to score videos during downtime. Further, observations and scoring can be completed in less time than in other, more popular, applications that emphasize peer observations. The Alvero and Austin method required no expertise on the part of participants in delivering feedback about safe and unsafe behavior (and therefore required no time for feedback delivery training), and it required less expertise by the trainer.

In hospital environments, staff are busy with a variety of patient care tasks, and they often work alone. Thus, it is inconvenient to conduct peer safety observations. Nursing staff (nurses, nursing aides, orderlies, attendants, psychiatric health aides, and home health aides) are especially at risk for developing back injuries. From 1995 to 2004, nursing aides, orderlies, and attendants as a group consistently ranked in third place among occupations reporting the highest number of cases of workplace injuries and illnesses, behind only truck drivers and laborers and material movers (U.S. Bureau of Labor Statistics, 2006). Back injury is the most frequently reported injury, accounting for approximately half of all reported injuries and illnesses in the health-care industry (U.S. Bureau of Labor Statistics, 2004). Behavioral safety applications have been successful in reducing the frequency of at-risk practices among nursing staff (Alavosius & Sulzer-Azaroff, 1986, 1990). However, the behavioral techniques that have proven to be effective tend to involve intrusive and time-consuming methods such as verbal feedback and graphic feedback, which also require considerable time commitments by supervisors or experimenters.

An important consideration in the implementation of behavioral interventions is the time commitment of staff and availability of staff to conduct peer observations. Furthermore, lone workers cannot receive peer feedback on safety on a regular basis because of the very nature of their work. Research on alternatives to peer observations that may provide employees with more flexibility to comply with the intervention and address lone worker issues is therefore called for (U.S. National Institute for Occupational Safety and Health, 2007, Behavioral Interventions Section, first paragraph).

The current study evaluated the effectiveness of video scoring and feedback about scoring on patient transfers by staff in a skilled nursing facility. This study extends previous work by Alvero and Austin (2004) by incorporating feedback to participants on their scoring, by using actual workers as participants exposed to video modeling and scoring, and by delivering corrective feedback to participants who did not show adequate improvement in lifting safety following video observation.

METHOD

Participants and Setting

Employees eligible for recruitment were registered nurses, technically advanced personnel, and patient care assistants. After 6 volunteers agreed to participate, the first author randomly assigned them to two groups (A and B). All participants were female, ranged in age from 20 to 49 years, and had been employed at this facility for 6 months to 6 years. All participants had received brief annual in-service training delivered by hospital staff on five-step patient lifting and transfers (Channing L. Bete Company, 2001): (a) assessing the situation, (b) preparing for the move, (c) preparing the patient, (d) positioning and adjusting equipment, and (e) using proper body mechanics.

All patients were adults who required partial assistance to stand from a sitting or lying position or to go from a standing position to a sitting or lying position. Approximately half of the patients were long-term patients of the skilled nursing unit, and half were admitted for short-term rehabilitation. All patients consented to videotaping when they were admitted to the hospital, as part of normal hospital procedures.

The experimental setting was a 21-bed skilled nursing unit in a rural acute care hospital located in the midwestern United States. The unit had 10 semiprivate rooms, one private room, bathrooms in each patient room, a nursing station, a medicine supply room, a general supply room, a staff conference room, a unit director's office, a support staff office, and a large community room.

Dependent Variables

Pivot transfers and standing or sitting lifts occurred frequently in the skilled nursing unit. Two types of one-person lifts were completed for each patient several times daily and were identified as the dependent variables. The two lifts were from wheelchair-to-standing and standing-to-wheelchair. The dependent variable for the current study was the percentage of safe lifting components, defined as the number of safe components for each lift type divided by the total number of components for the lift, and this ratio was converted to a percentage. A component was scored as safe if it met the definition for safe behavior, and was scored as at risk if it did not meet that definition (see Tables 1 and 2 for definitions of safe components). Wheelchair-to-standing and standing-to-wheelchair lifts consisted of 18 and 17 components, respectively. Each component belonged to one of three categories: equipment setup, topographical body movements, and assisting or instructing the patient.

Data Collection

The first author and one trained graduate assistant scored videos that depicted participants completing the various patient lifts, using a checklist for each lift (see Tables 1 and 2 for checklist components). The first author designated a primary observer in an alternating fashion prior to data collection during a given session.

All lifts involved patients who needed assistance but were able to independently complete approximately 50% or more of lift components. The patient's ability to assist in his or her own lifts was identified by the physical therapy department of the hospital for all patients throughout the course of the study. Lifts occurred as patients left or returned to their beds or as they entered or left the

Table 1
Safety Percentages for Wheelchair-to-Standing Lift Components

	Component	A2 BL	A2 IN	A2 VS	A2 FB	A1 BL	A1 IN	A1 VS	A4 BL	A4 VS
1.	Communicate procedure to patient	91	90	93	100	33	80	100	44	50
2.	Worker's feet more than shoulder width apart	36	90	93	100	33	60	94	100	100
3.	Position wheelchair, lock brakes	100	100	100	100	67	100	100	100	100
4.	Move out foot rests	100	100	100	100	100	100	100	100	100
5.	Apply gait belt	100	100	100	100	100	100	100	89	100
6.	Face the patient	9	10	21	33	89	100	100	56	75
7.	Patient's feet are on floor, shoulder width apart	64	30	50	100	37	0	6	44	25
8.	Patient moves to the edge of chair	45	60	93	100	56	100	87	44	25
9.	Patient places hands on arm rests	45	80	86	100	29	80	56	44	0
10.	Squat, bending at the knees	0	10	14	0	56	80	100	44	75
11.	Worker's hands on the gait belt	9	40	79	100	100	100	100	56	75
12.	Bend at the hips to lean forward	27	80	93	100	78	100	100	100	100
13.	Lifter's head up	0	0	14	100	11	20	94	56	75
14.	Instruct the patient to stand	45	80	93	100	67	80	87	44	50
15.	Knees slightly bent and shoulders above waist	0	30	93	67	56	100	100	56	100
16.	Torso is still, no twisting at the waist	0	10	57	100	44	80	100	56	100
17.	Shift weight back	0	10	21	100	67	80	100	56	75
18.	Continue to assist until patient is standing	82	100	100	100	100	100	100	100	100

Note. BL = baseline, IN = safety information, VS = video scoring, FB = feedback.

community room. An observer videotaped each lift. Participants were told that videotaping served the purpose of collecting data on the safety of patient lifts. No videotaping occurred in situations in which violations of privacy could occur (e.g., when using the bathroom).

All experimental sessions occurred during the daily shift for each participant over the course of approximately 7 months. An observer recorded one lift for each participant during each shift, near the beginning of the shift. Each patient lift required approximately 1 to 3 min to complete.

Table 2
Safety Percentages for Standing-to-Wheelchair Lift Components

	Component	B6 BL	B6 IN	B6 VS	B6 FB	B7 BL	B7 IN	B7 VS	B9 BL	B9 IN	B9 VS
1.	Communicate procedure to patient	45	71	100	100	67	89	100	0	89	33
2.	Position wheelchair, lock brakes	100	100	100	100	100	100	100	71	100	100
3.	Move foot rests	100	100	100	100	100	100	100	100	100	100
4.	Apply or remove gait belt	82	100	100	100	100	100	100	86	100	100
5.	Face the patient	9	18	7	40	17	11	67	14	0	100
6.	Worker's feet more than shoulder width apart	45	47	100	100	83	100	100	14	89	100
7.	Make sure both feet are facing chair	0	24	0	40	17	11	67	14	11	100
8.	Lifter's head up	0	0	14	20	0	33	100	0	0	0
9.	Instruct patient to feel chair against back of legs	0	41	100	100	17	78	33	0	44	0
10.	Patient assists by placing hands on arm rests	55	65	57	100	50	56	67	29	78	67
11.	Worker's hands on gait belt	18	88	93	100	50	100	100	29	89	100
12.	Worker's knees bent and shoulder width apart	0	18	50	100	33	78	67	29	67	100
13.	Instruct the patient to stand	0	35	100	80	33	100	67	0	67	33
14.	Lower patient slowly, bend at hips and knees	0	12	29	100	33	78	67	14	33	100
15.	Torso is still, no twisting at the waist	0	0	7	80	0	11	100	57	44	100
16.	Position the patient	45	88	100	100	83	100	100	100	100	100
17.	Move the foot rests into place	100	100	100	100	100	100	100	100	100	100

Note. BL = baseline, IN = safety information, VS = video scoring, FB = feedback.

Interobserver agreement. Interobserver agreement data collection occurred during 79 (33%) of sessions. Two observers scored videos of lifts simultaneously, and scored each lift component independently. An agreement was defined as two independent observers scoring the same component in the same manner. A disagreement was defined as one observer scoring a component as safe, and the other observer scoring the component as at risk. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus the number of disagreements and converting this ratio to a percentage. Agreements for the baseline phase, information phase, video scoring phase, and feedback phase were 95%, 95%, 97%, and 96%, respectively, for Group A and 96%, 94%, 99%, and 95%, respectively, for Group B.

Experimental Design

The phases of this study were baseline, information, video scoring, lifting feedback, and withdrawal. We used a combination reversal and multiple baseline design across individuals to evaluate the effectiveness of the intervention components on safe patient lifts. Following baseline, 5 participants received information, all participants received video modeling, and 2 participants received feedback following video modeling. A withdrawal phase followed treatment for all participants. A new phase started for each participant, in a staggered fashion, when safety levels of preceding data points appeared to be stable based on visual analyses.

Intervention

During the information phase, participants received a checklist and definitions of the safe components of two types of lifts. During the video scoring phase, each participant used a checklist to score the lifting behavior of a confederate performing a lift on videotape. The first author also delivered corrective verbal and graphic safety feedback to 1 participant from Group A and 1 participant from Group B.

Materials and Equipment

The first author recorded all patient lifts with a videocamera that was in plain view of participants. He also created 20 example videos of each of the two primary types of patient lifts using confederates from the hospital's physical therapy department as models. Examples included correct and incorrect components of each lift. The first author reviewed and scored all videos independently, using checklists to determine which components were correct and incorrect for each example, so that a verifiable standard score could be applied to each video recording.

Procedure

Baseline. The first author recorded participants from Group A as they engaged in wheelchair-to-standing patient lifts and participants from Group B as they engaged in standing-to-wheelchair lifts.

Information phase. Following the baseline phase, the first author read to each participant an introductory script for the information phase (Participant A4 worked a limited number of shifts and was not exposed to the information phase). Participants A1 and A2 reviewed the checklist and individually discussed each component of the wheelchair-to-standing lift with the first author. Employees from Group B followed the same procedure for the standing-to-wheelchair lift. The first author read the following script to participants:

> We are going to review the components of one type of patient lift. This is a patient lift that is commonly used on this unit of the hospital. Using these components in this order for this type of patient lift will help you to remain relatively safe and will reduce the risk of injuring yourself. Please initial this checklist in the comments section to indicate that we have reviewed each item of the checklist. I will keep this copy for my records. Do you have any questions?

These components were already familiar to each participant as a result of the in-service training described above. This procedure occurred prior to all information phase sessions.

Video scoring phase. At the beginning of the video scoring phase, participants in Group A individually reviewed one videotape that showed a model completing one wheelchair-to-standing lift, and participants in Group B individually reviewed a videotape of a model completing one standing-to-wheelchair lift. These sessions occurred at the beginning of each shift for each participant. The first author prepared 21 video models depicting lifts, and all participants scored video models in the same order. Video lifts varied in the degree to which they depicted safe lifts (range, 25% to 90% safe components per lift).

During this phase, each participant scored the lift using the appropriate checklist, which corresponded in terms of components to the checklists used to score participants' own lifting behavior. After scoring was complete, the first author compared participants' scoring on an item-by-item basis to criterion checklists developed independently by the first author for each of the model videos. He then provided private feedback on the participant's scoring of each item of the checklist, asking why she scored the item in the manner that she did. The private feedback sessions occurred in the staff conference room. Correct responses resulted in verbal agreement and praise. The first author identified incorrect scoring and explained the correct score. He provided no specific safety feedback or stated future beneficial consequences from the correct lifting behaviors during these sessions. Each participant continued scoring the models demonstrating the wheelchair-to-standing lift (for Group A) or standing-to-wheelchair lift (for Group B) at the beginning of each shift throughout the phase.

In the video models depicted in wheelchair-to-standing lifts, the following components always appeared as safe: move out foot rests, apply a gait belt, and instruct the patient to stand. The following components always appeared as at risk for wheelchair-to-standing lifts: patient moves to the edge of the chair, and the model starts in a squatting position. In the models of the standing-to-wheelchair lifts, the following components were always safe: lock brakes, move out foot rests, and apply a gait belt. The following component always appeared as at risk for the standing-to-wheelchair lifts: feet shoulder width apart. The remainder of the components appeared as at risk or safe across the samples for both lift types.

Graphic and verbal feedback. The first author met with Participants A2 and B6 individually at the start of each shift and discussed the lifts that were scored for the previous shifts, showing the participant a graph depicting the percentage of each lift component performed safely during each of the previous phases. He also specified the lift components that the participant could improve to increase her overall safety percentage. Participants did not view and score video lifts during this phase.

Withdrawal. During the withdrawal phase, all treatment components were removed for all participants, and videotaping of lifts continued for all participants as described above.

RESULTS

Figure 1 displays the results of the intervention on wheelchair-to-standing lifts for Group A, and Figure 2 displays the results of the intervention on standing-to-wheelchair lifts for Group B. An improvement appears to have occurred for 5 of the 6 participants when exposed to safety information alone, but 4 participants showed a downward trend and 1 of the 5 (B9) returned to baseline by the end of this condition. Further improvements in behavior, beyond that produced by information alone, occurred for the 5 of the 6 participants who received video scoring. The 2 participants who received feedback following video scoring showed further improvement. During the withdrawal condition, the 2 participants who received feedback returned to the level exhibited for video scoring, and the remaining 3

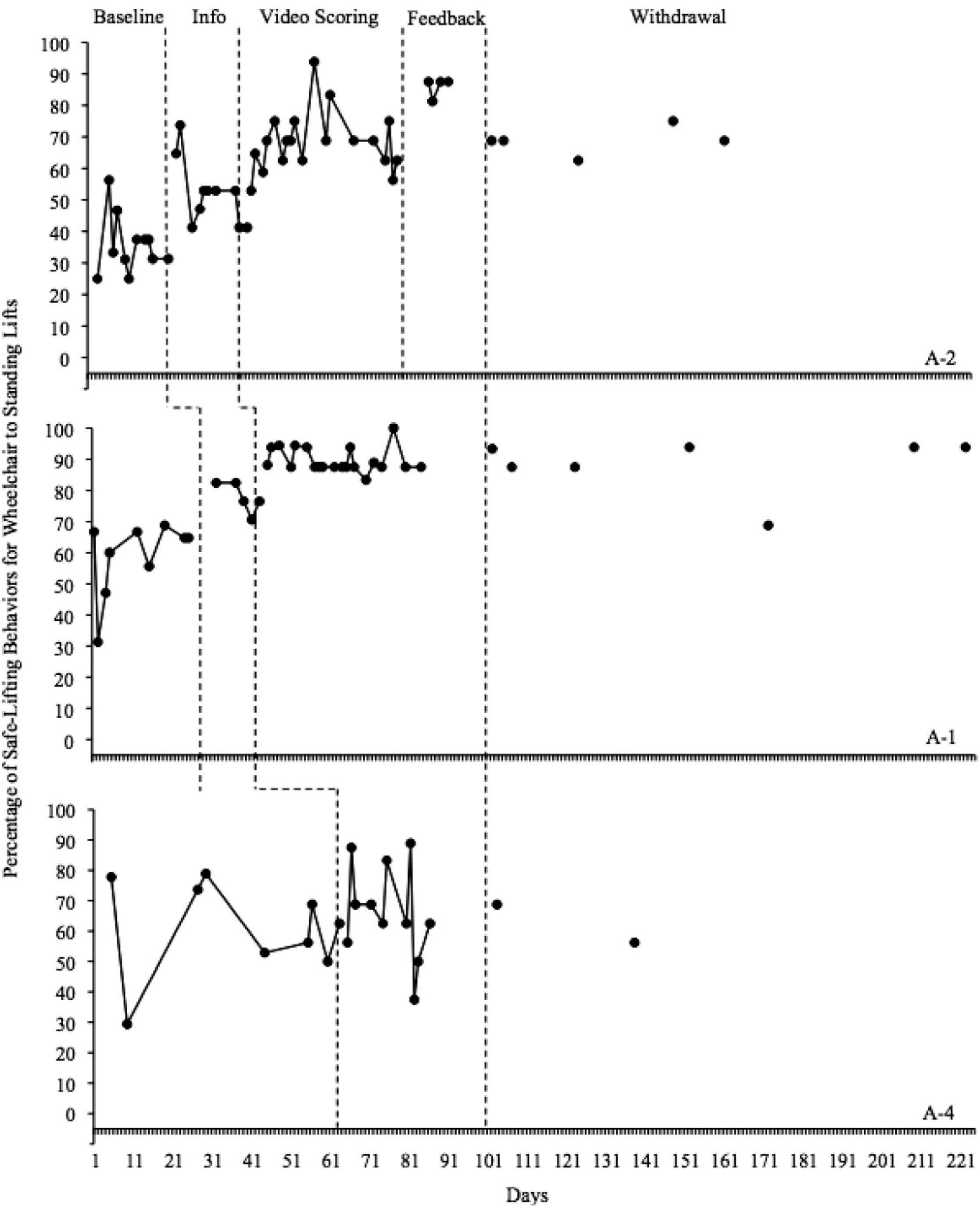

Figure 1. Percentage of safe lifting behaviors across experimental phases for wheelchair-to-standing lifts.

participants who responded well to video scoring alone maintained their improvement in behavior (the exception was B9). In the case of B9, there were not enough data points to determine whether safer lifting behaviors were maintained.

Participants missed many of the same components over the course of the study. All

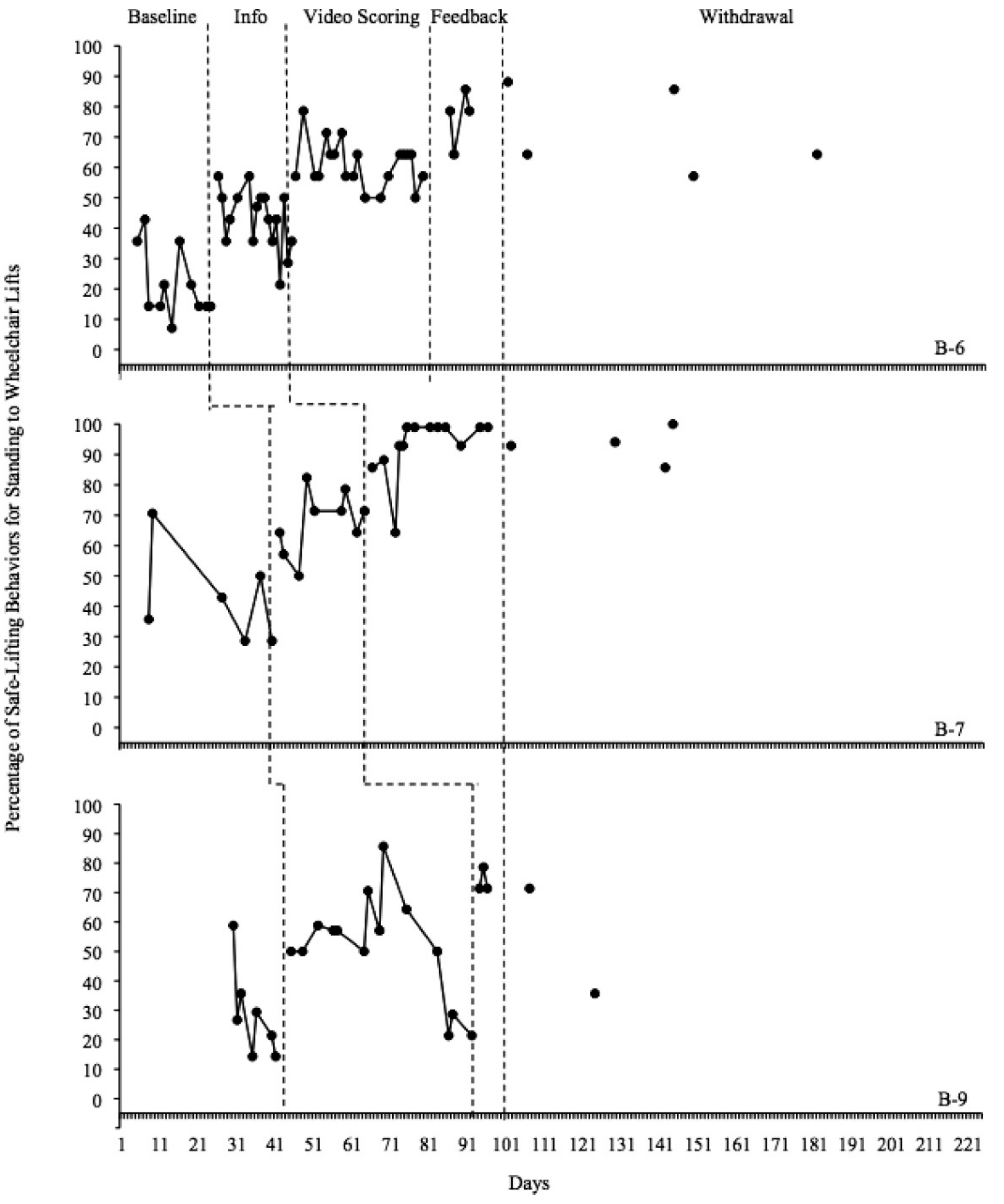

Figure 2. Percentage of safe lifting behaviors across experimental phases for standing-to-wheelchair lifts.

of the participants consistently locked the wheelchair and moved the foot rests. Gait belts were consistently applied at all times. Participants A2 (Table 1) and B6 (Table 2) often failed to directly face the patient (which also meant that both of their feet were not pointing towards the patient). These 2 participants consistently failed to keep both hands on the gait belt and to keep their heads up during the lift. The feedback phase resulted in improvements of these specific components for these 2 participants. During the follow-up phase, Participants A2 and B6 were again not safe in regards to facing the patient and keeping their heads up during the lift (see Tables 1 and 2).

DISCUSSION

The results of the current study suggest that information, video scoring, and feedback on lifting may increase safe patient lifts. Overall improvement in the safety of lifts is important, in that safer behavior may result in a lower risk of back injury. This reduced risk would be a benefit to health care workers, the institutions who employ them, and to the patients who are assisted in lifts.

One of the strengths of the current study is the focus on a socially important behavior. Manual patient lifts are commonly used in the health care industry and a leading cause of injury among health care workers. The procedures used in assisting patients in lifts in this study are typically used in skilled nursing facilities. They are also used in acute-care hospital settings, nursing homes, home health care, and physical therapy facilities. These procedures could be easily adapted to other settings and appear to offer areas for future research in the arena of lifting and MSDs. Another strength of the current study is the limited amount of time needed for participants to review the correct components of a patient lift (about 1 min during the information phase) and to view and score models completing patient lifts (about 3 to 5 min during the video scoring phase). All of the participants reported that their participation did not interfere with their normal daily duties.

With the exception of Participant A4, improvements may have occurred because each experimental phase included increasingly clear or intrusive prompts for safe behavior. During the information phase, the written components of a patient lift may have served an instructional or prompting function. However, 4 of the 6 participants exhibited a downward trend in safe behavior during this phase, even though they received the information before every session. The presence of such a trend suggests that providing information about the various components of safe patient lifts may improve behavior initially, but does not sustain high levels of safety. During the video scoring phase, examples of models completing correct and incorrect lifts may have served as more effective prompts because the video delivered more detailed instruction (through visual example and nonexample) or because participants received feedback on the accuracy of their scoring, resulting in higher quality instruction of safe lifting components. In addition, video scoring may have occasioned self-monitoring. Previous research suggests that evaluating the behavior of others may promote self-monitoring behavior by the observer, leading to changes in observer behavior when the observer engages in tasks similar to those scored on the videotape (Alvero & Austin, 2006). Finally, for 2 participants, feedback about their own lifting behavior identified the components they were completing correctly and those that needed improvement. A withdrawal phase was applied to the 6 participants who completed the scheduled intervention phases. Behavior continued at improved levels for 4 of the 5 participants who showed a treatment effect, suggesting the potential for long-term positive effects of the interventions.

Individual components of lifts varied somewhat in their baseline rates and improvements across the phases of the study. Behaviors that occurred with approximately 100% levels of safety throughout were mostly equipment setup behaviors, although not all setup components exhibited that pattern. Behaviors that were performed with low levels of safety by Participants A2 and B6 through baseline, information, and video scoring, and then improved following feedback, were almost exclusively body movements. These results suggest that a comprehensive package may be necessary at the outset of an intervention that targets the safe execution of a behavioral chain that is fairly extended in time. Feedback then may be needed to improve certain subcomponents that fail to improve following less intrusive interventions. Furthermore, feedback may especially be needed to aid in the discrimination of safe topographies of body movements from at-risk topographies. A feedback intervention of the sort used here may be effective because it enables participants to discriminate between kinesthetic stimuli associated with safe and at-risk movements, and those kinesthetic stimuli then come to exert control over postural behavior (Sigurdsson & Austin, 2008). Such feedback may not be needed for components that involve setup and assisting the patient, in that the occurrence or nonoccurrence of such behaviors are easily discriminated by the performer.

There are two possible factors that might explain why behavior failed to improve during the video scoring phase for Participant A4. During Sessions 9, 10, and 11, Participant A4 was videotaped as she assisted the same patient each session. During Session 9 she reported that this patient required less assistance, in her opinion, than other patients, and she therefore completed fewer of the components of the lift in a safe manner. If these three sessions are factored out, her percentage of correct patient lift components is 72% (an 11 percentage point increase over baseline). A second contributing factor may be that the sequence of all three phases is important in improving safe behavior during patient lifts, at least for some health care workers. Future research should examine this possibility by having several participants complete the baseline, information, and video scoring phases similar to this study and comparing the results to participants exposed only to the baseline and video scoring phases.

Because the effectiveness of safety feedback had been established for 2 participants (B6 and A2), we wanted to determine whether performance would improve over time in the absence of safety feedback for A4, who had not responded to the video scoring intervention. Withdrawal observations revealed that safety performance did not improve in the absence of safety feedback for that participant. It is also important to note that both participants who received feedback returned to the level attained during video scoring during the maintenance phase, suggesting that this treatment may not produce enduring effects.

In the current study, participants were trained in only one type of lift, and further studies could attempt to train both types simultaneously. Future research might also investigate the effects of having one group lift the same patients over several sessions and compare the results with another group who lift different patients for each session. This could reduce one of the variables that may be responsible for variability in lifting behaviors. Throughout this study, participants lifted patients on a random basis. Participants were videotaped as they completed the first patient lift of their shift and were therefore exposed to conditions such as lifting patients with different needs, which could have resulted in variability in their behavior.

REFERENCES

Alavosius, M. P., & Sulzer-Azaroff, B. (1986). The effects of performance feedback on the safety of client lifting and transfer. *Journal of Applied Behavior Analysis*, *19*, 261–267.

Alavosius, M. P., & Sulzer-Azaroff, B. (1990). Acquisition and maintenance of health-care routines as a function of feedback density. *Journal of Applied Behavior Analysis*, *23*, 151–162.

Alvero, A. M., & Austin, J. (2004). The effects of conducting behavioral observations on the behavior of the observer. *Journal of Applied Behavior Analysis*, *37*, 457–468.

Alvero, A. M., & Austin, J. (2006). An implementation of protocol analysis and the silent dog method in the area of behavioral safety. *The Analysis of Verbal Behavior*, *22*, 61–79.

Austin, J., Kessler, M. L., Riccobono, J. E., & Bailey, J. S. (1996). Using feedback and reinforcement to improve the performance and safety of a roofing crew. *Journal of Organizational Behavior Management*, *16*(2), 49–75.

Channing L. Bete Company. (2001). *Lifting and moving patients safely: A guide for health-care staff*. South Deerfield, MA: Author.

Charlop, M. H., & Milstein, P. J. (1989). Teaching autistic children conversational speech using video modeling. *Journal of Applied Behavior Analysis*, *22*, 275–285.

Cuvo, A. J., & Klatt, K. P. (1992). Effects of community-based, videotape, and flash card instruction of community-referenced sight words on students with mental retardation. *Journal of Applied Behavior Analysis*, *25*, 499–512.

Geller, E. S. (1996). *The psychology of safety: How to improve behaviors and attitudes on the job*. Radnor, PA: Chilton.

Hitchcock, C. H., Prater, M. A., & Dowrick, P. W. (2004). Reading comprehension and fluency: Examining the effects of tutoring and video self-modeling on first-grade students. *Learning Disability Quarterly*, *27*(2), 89–103.

Krause, T. R., Seymour, K. L., & Sloat, K. C. M. (1999). Long-term evaluation of a behavior-based method for improving safety performance: A meta-analysis of 73 interrupted time-series replications. *Safety Science*, *32*, 1–18.

Ludwig, T. D., Biggs, J., Wagner, S., & Geller, E. S. (2001). Using public feedback and competitive rewards to increase the safe driving of pizza deliverers. *Journal of Organizational Behavior Management*, *21*(4), 75–104.

Ludwig, T. D., & Geller, E. S. (2001). *Intervening to improve the safety of occupational driving*. Binghamton, NY: Haworth Press.

National Safety Council. (2002). *Injury facts*. Itasca, IL: Author.

Nolan, T., Jarema, K., & Austin, J. (1999). An objective review of *Journal of Organizational Behavior Management*: 1986–1997. *Journal of Organizational Behavior Management*, *19*(3), 83–115.

Olson, R., & Austin, J. (2001). Behavior-based safety and working alone: The effects of a self-monitoring package on the safe performance of bus operators. *Journal of Organizational Behavior Management*, *21*(3), 5–43.

Sigurdsson, S. O., & Austin, J. (2008). Using real-time visual feedback to improve posture at computer workstations. *Journal of Applied Behavior Analysis*, *41*, 365–375.

Sulzer-Azaroff, B., & Austin, J. (2000). Behavior-based safety and injury reduction: A survey of the evidence. *Professional Safety*, *45*(7), 19–24.

Sulzer-Azaroff, B., Loafman, B., Merante, R. J., & Hlavacek, A. C. (1990). Improving occupational safety in a large industrial plant: A systematic replication. *Journal of Organizational Behavior Management*, *11*(1), 99–120.

U.S. Bureau of Labor Statistics. (2004). *Occupational injuries and illnesses: Industry data*. Retrieved March 5, 2005, from http://www.bls.gov

U.S. Bureau of Labor Statistics. (2006). *Occupational injuries, illnesses, and fatalities among nursing, psychiatric, and home health aides, 1995–2004*. Retrieved June 24, 2007, from http://www.bls.gov/opub/cwc/sh20060628ar01p1.htm

U.S. Bureau of Labor Statistics. (2009). *Occupational injuries and illnesses: Industry data*. Retrieved February 9, 2009, from http://www.bls.gov

U.S. National Institute for Occupational Safety and Health. (2007). *NIOSH program portfolio*. Retrieved June 24, 2007 from http://0-www.cdc.gov.mill1.sjlibrary.org/niosh/ programs/msd/emerging.html

U.S. Occupational Safety and Health Administration. (2004). *Ergonomics programs: Preventing musculoskeletal disorders*. Retrieved December 8, 2004, from http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=UNIFIED_AGENDA&p_id=4167

Received July 13, 2007
Final acceptance June 20, 2008
Action Editor, Ron Van Houten