

An Evaluation of the Stryker® Motorized Zoom® Stretcher vs. Standard Transport Stretchers

Conducted by:

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Evaluation Site:

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Introduction

In an article discussing ergonomics in the hospital setting, Craig Shepherd pointed out that there are “a high number of musculoskeletal injuries, specifically sprains and strains among nurses aides, registered nurses, and orderlies.” He further states that the handling tasks that are required of these personnel create physical demands that are unique to the hospital industry. Not only are the positions awkward in the transfer of patients, but the potential for an abrupt change in the load during the transfer adds to the risk and possibility for injury. He also says, “Ergonomic equipment purchases often pay for themselves exponentially over time and can improve employee morale and retention....”

During the past three years at St. Alexius Medical Center, a number of minor strains and injuries to transport staff have been recorded. There have been two major workmen’s compensation claims, one with a claim value of \$171,000 and the other for \$46,000.

Based on Department of Labor statistics, the number of nonfatal injuries and illnesses involving days away from work in the health services industry was a total of 154,983 in the year 2001. Of these, 64,440 were listed as “overexertion,” with 30,944 of those related to lifting. Hospitals accounted for 70,974 (46%) of the total cases, with the overexertion component for hospitals a total of 30,389 (47%) and lifting accounting for 13,427 (43%) of these. Hospitals represented the largest total segment of such injuries in health services in numbers, with nursing and personal care facilities second.

The overall incidence of nonfatal occupational injuries for hospitals in 2001 was 8.2 per 100 full-time workers. By comparison, nursing and personal care facilities had an incidence rate of 13.0 per 100 full-time workers. The overall incidence rate for all private industry in 2001 was 5.7 per 100 full-time workers and in the services sector (where health services are classed) it was 4.6. Strain and lifting injuries are a significant problem in hospitals and methods of reducing this common risk to staff are needed.

In a seven hospital study conducted in Massachusetts, 18 percent of strain and sprain injuries to healthcare workers resulted from repositioning, but 11 percent resulted from transport of patients. The lead author of the study, Guy Fragala, said, “I don’t know if a lot of hospitals understand how big this problem really is.”

At St. Alexius Medical Center, the transport team in day surgery usually works in pairs to reduce the strain of transfer and transport that can occur with only one patient transporter. The standard transport stretchers currently in use lend themselves to potential back injuries and other musculoskeletal injuries due to the jolting motion of starting, stopping and changing directions.

Stryker’s Zoom stretcher was evaluated at St. Alexius Medical Center as a possible solution to this risk. The Zoom stretcher has a motorized drive system that responds to activation by the patient transporter using two drive handles. The drive system reduces or eliminates the strain on the transporters back and arms when starting and stopping the stretcher. The motor drive also assists in reducing transporter energy input to maneuver and keep the stretcher moving in open hallways. The goal of adopting Stryker’s Zoom stretcher is to reduce the stress and strain on patient transporters, in turn reducing injuries. It may also allow one transporter to effect patient transport where two are commonly used now.

Evaluation Objectives

- To assess the benefit of Stryker’s Zoom stretcher as compared to non-motorized stretchers for patient transport.
- To evaluate the musculoskeletal strain placed on patient transport staff using both types of stretchers.
- To compare patient transport staff self-evaluation of musculoskeletal strain before and after each transport event using both types of stretchers.
- To compare transport time between the two types of stretchers.

Trial Design

The trial involved self-assessment questionnaires that were completed by each patient transporter before and after each transport event. Staff was also interviewed during the trial for individual comments, and a final evaluation was collected from each transporter as well. Staff used both types of stretchers in a selection method based on availability of stretchers. The intent was not to inhibit the flow of work in these very busy patient care areas. Since all stretchers in the endoscopy department were converted to Zoom before the trial began, and since the primary transporter was based in this area, a predominance of Zoom evaluations were obtained. However, analysis was conducted to provide an effective comparison of the two types.

The trial was conducted over a six-week period, with 177 events being recorded, 134 using the Zoom stretcher, 39 using standard stretchers and four unknowns. Patient weight was one uncontrollable variable, but the weight was recorded as part of the data collection and was evaluated for potential effect on results.

Methodology

The following information was collected on the evaluation form:

- Transporter name
- Date
- Stretcher type
- The sequential number of the transport event that day
- Start time
- Patient pick up location
- End time
- Patient delivery location
- Any stops on way, reason and duration
- Number of transporters
- Patient weight
- The overall physical feeling of well being of the transporter at the start and end of the transport event, as measured using a visual analog scale (VAS)

Transporters were briefed on the meaning and use of this VAS. The VAS recording line allowed for capture of a feeling from best to worst by marking an “X” on the line. The line was later measured to determine a numerical equivalent, with 10 being the best rating and one being the worst. This number was then used in evaluating the assessment of physical well being, and comparisons between types of stretchers were made. Patient weight was also evaluated as a variable along with length of time of the transport event.

Data Analysis

As noted above, the VAS line was converted into a quantitative number expressing the overall physical well being of the transporter, based on a self assessment conducted at the time of the transport event. The use of the VAS eliminates the bias that can be associated with using a direct numerical measure, such as selecting a number from one to ten. The transporters simply mark a point on a line to represent their feelings. The point is later converted to its numerical equivalent.

Patient weight could have been a significant confounding variable in this study. Since the weight of patients that presented for transport during the time of the study could not be predicted or selected, and since the weight can vary widely and may have an impact on the transport event and outcome, patient weight was a potentially critical issue in the analysis. By capturing the patient weight on the evaluation form, the impact on the study could be assessed during the analysis period.

The resulting data provides a useful indicator of differences between the standard stretcher and the motorized Zoom stretcher in terms of physical impact on the patient transporters. Additional information was captured by interviews with the transporters during and immediately after the evaluation. A list of questions was developed to ask each transporter, and transporters were individually interviewed. The interviews were brief and focused on the subjective feelings of each transporter relative to the two types of stretchers. This subjective information helped to expand the more objective result from the VAS measurements and other data points, and was compared with these measurements.

Institutional Review

Due to the nature of the study, patient consent was not an issue. No protected health information was collected from patients, so there was no need for HIPAA authorization. Both Stryker and Alexian Brothers may use the data internally. However, there was no involvement of patients or volunteers in the study. All collected information came from employees performing their normal duties. The study is research in the broadest sense because it collected data in a systematic way and that data is being shared with Stryker. For this reason, the Chair of the Institutional Review Board was notified of the study and reviewed and approved the protocol prior to the study initiation.

Administration of Protocol

Gary Anderson, the Director, Clinical Research of Alexian Brothers Hospital Network (ABHN), administered the trial. On site responsibility for protocol compliance resided with Janet O’Callahan, RN, Director of Day Surgery at St. Alexius Medical Center. The ABHN Director, Clinical Research functioned as monitor for the study, collecting and analyzing all data, briefing all staff on the project and conducting interviews with transport staff.

Results

The four “unknown” stretcher types were deleted from further analysis, leaving 173 events to analyze. The initial computations are shown below. After total events were collected, the data was split between Zoom and standard events. The three sets are compared below.

Number of Events	Total	Zoom	Standard
Zoom	134	134	0
Standard	39	0	39
Total	173	134	39

Transport Time (in minutes)	Total	Zoom	Standard
Average (mean)	15	14	21.5
Median	15	15	20
Standard Deviation	6	5.3	6.8

Weight (pounds)	Total	Zoom	Standard
Average (mean)	168.3	166.5	174.6
Median	160	160	170
Standard Deviation	45.8	45.6	46.3

Transporter Satisfaction - START of event (VAS scale)	Total	Zoom	Standard
Average (mean)	8.1	9.1	5
Standard Deviation	2.5	1.5	2.2

Transporter Satisfaction - END of event (VAS scale)	Total	Zoom	Standard
Average (mean)	8.1	9	4.9
Standard Deviation	2.6	1.8	2.3

Transport Method	Total	Zoom	Standard
Transported Alone	126	111	15
Transported with Partner	43	20	23
Unknown	4	3	1

Comparative statistics were then performed on the data for Zoom versus standard stretchers, looking at weight, time for transport and transporter satisfaction at the finish of an event. Since there was little variance between start and finish using the VAS scale numbers, the finish number was selected for consistency and simplicity of analysis. A statistical z-score was computed to determine the level of significance between the Zoom and standard stretcher events for these three factors. Number of events varied among the groups due to missing data points. The results are shown below:

Weight (pounds)	Zoom	Standard
Average (mean)	166.5	174.6
Number of Transports	129	37
Standard Deviation	45.6	46.3

Standard Error	8.61
z-test	0.94
p-value	0.3459

Transport Time (in minutes)	Zoom	Standard
Average (mean)	14	21.5
Number of Transports	131	36
Standard Deviation	5.3	6.8

Standard Error	1.22
z-test	6.18
p-value	<0.002

Transporter Satisfaction	Zoom	Standard
Average (mean)	9	4.9
Number of Transports	124	35
Standard Deviation	1.8	2.3

Standard Error	0.42
z-test	-9.74
p-value	<0.002

Results show the mean weight between the Zoom and standard stretcher groups was not significantly different ($p=0.3459$). However, a significance with a p -value <0.002 was found for the difference between both time for transport in minutes and overall satisfaction at the end of the transport events in comparison of the Zoom to the standard transport events. In both of these cases, the Zoom stretcher was superior to the standard stretchers.

One additional comment on patient weight, it was noted above that this factor was uncontrollable and potentially variable. One patient in particular had a recorded weight of 377 pounds. The transporter, working alone, for this patient was using the Zoom stretcher and felt compelled to note on the evaluation that “I don’t even feel the weight. Feel great.”

Consideration was given to the potential impact that transporting alone versus transporting with a partner might have on this analysis. The data were further divided to look at these results. While the numbers are small, the outcome remained substantially the same. Weight did not reach a level of significance regardless of how the data were compared. In looking at the time for transport using the Zoom stretcher, there is a significance difference between working alone and with a partner, indicating that working alone takes less time. The average time for transport alone with the Zoom stretcher was 13.1 minutes, while with a partner required 17.7 minutes on average (z score = 3.677, p value less than 0.0002). Also, the satisfaction rating at the end of transport reflected a difference favoring working alone. An average rating of 9.5 for working alone versus 6.0 in partnership was noted (z score -10.07, $p<0.0002$).

However, in looking at the standard stretchers the same way, no significant differences were noted. Time for transit averaged 20.6 minutes alone versus 22.3 minutes with a partner (z score 0.64, $p=0.522$) and ending satisfaction ratings were 4.9 alone versus 4.8 with a partner (z score -0.155, $p=0.877$).

It appears that this data indicates a preference for working alone with the Zoom stretcher, perhaps due to the ease of use. It even appears that having a partner may slow down the overall transit time. Comparatively, there appears to be no such distinction when using the standard stretchers.

The data were supported in the interviews conducted during the evaluation, and in a feedback form collected from transporters at the close of the study. Discussion of these two qualitative data collection efforts follows.

On October 9, 2003, three weeks after initiation of the evaluation, one-on-one interviews were conducted with six transporters. Questions were used to guide the interviews. Six questions were asked of each transporter. Each question is discussed below.

Question 1: “Do you feel you could safely transport a patient by yourself using a standard stretcher? Why or why not?”

Most answered “no” or that they preferred to have assistance. One person found the standard stretcher was easier to maneuver, especially in a small room. One person noted that the standard hospital order was to have a partner, primarily to assist in transfers to and from the bed.

Question 2: “Do you feel you could safely transport a patient by yourself using the Zoom stretcher? Why or why not?”

All agreed the Zoom was easier and preferred. They found it easier to steer and maneuver thanks to the power it provides. One person found the Zoom heavy to work with when in manual mode, which was the only negative comment. One of the most active transporters said that working alone was preferred with the Zoom, and that a second person sometimes was in the way.

Question 3: *“Which stretcher requires the use of more energy during transports?”*

The unanimous choice was the standard stretcher. One person commented that the Zoom in manual mode required more energy.

Question 4: *“Would you prefer to transport patients using a standard stretcher or a Zoom stretcher? Please explain.”*

Five of the six preferred the Zoom, with comments such as:

- “[I] have a weak back...less risk of injury using Zoom”
- “Less strain on back; feel better at end of the day.”
- “Zoom is easier to steer on any surface; smoother ride; less push needed and looks nice, too.”
- “Zoom runs smooth and looks good; hand control of power is a good advantage.”
- As a small person the “patient outweighs me and I don’t want to hurt my back. I want a life after nursing.”
- Prefer standard because “used to using it. Don’t know what you’ll encounter on the way.”

Question 5: *“Do you feel that the purchase of the Zoom stretchers was a valuable investment for this department?”*

The consistent response was “Yes.” Even the transporter who preferred the standard in some aspects agreed that the Zoom was a good purchase overall.

Question 6: *“Does the addition of the Zoom stretchers make this department a more attractive working environment versus other departments that do not have Zoom stretchers?”*

The overall opinion, again, was “Yes.” One person said other departments should have them as well. Two transporters commented again on how nice the stretchers looked and the quality of the components.

At the end of the evaluation period, on November 4, 2003, a final questionnaire was distributed to seven transporters, including additional personnel who used the stretchers during the evaluation period and contributed comments. This form was designed to capture information primarily in a choices format. The seven questions are listed below with a summary of answers.

Question 1: *“When I transport patients I prefer to use a (circle one): STANDARD STRETCHER or ZOOM STRETCHER.”*

All seven selected the ZOOM STRETCHER.

Question 2: *“Please tell us why you prefer the stretcher that you selected above (list your reasons)”*

- “Much easier to use. Less back strain.”
- “The Zoom bed does all the work therefore there is less physical strain.”
- “Much easier to push alone.”
- “Because it is easier to maneuver and I do not have to worry about putting a strain on my back.”
- “It’s a smarter transport. One person can do the work of two.”
- “Much easier and quicker; take less energy; I feel good end of day.”
- “Smooth ride, no hard pushing and comfortable and pretty.”

Question 3: *“Patient transports are (easier/harder) for me when I use a Zoom stretcher.”*

All chose “easier.”

Question 4: *“I use (less/more) energy when I transport a patient with a Zoom stretcher.”*

All selected “less.”

Question 5: *“Transports take (less/more) time when I use a Zoom stretcher.”*

All selections were marked “less,” which was born out by the statistics.

Question 6: *“I feel better at the end of the day when I use a Zoom stretcher for transports (vs. how I feel when I use a standard stretcher all day) TRUE or FALSE”*

All marked “TRUE,” which was also supported by the data.

Question 7: *“I feel other departments would benefit from the purchase of additional Zoom stretchers. TRUE or FALSE”*

All marked “TRUE.”

One final comment written at the bottom of the form perhaps sums it up best. The transporter simply wrote, “Thank you for introducing Zoom stretcher.”

Discussion

From the start of the project it was clear the Zoom stretcher was a favorite among many of the transporters. There were some initial issues with maneuvering in close quarters, but familiarity with the procedures and differences of the Zoom versus standard stretchers resolved these issues. It should be noted that adequate time for in-service training should be allowed anytime that the product is introduced. Training in maneuvering the stretcher in tight spaces and on and off elevators is especially critical. There is always a level of resistance to new things and different ways, but the Zoom seems to win overall for ease of use.

The evaluation of this new technology was undertaken in real time, with no change in normal workload. It became quickly apparent that the preferred transport method was the Zoom, so much so that the evaluation team had to ask the transport staff to use the standard stretchers more often to complete the trial. Most of the issues that came up with the adoption of the Zoom stretcher were the result of introducing something new into an established process. The trial process forced staff to focus on the differences as part of the evaluation process. Overall, this probably accelerated the adoption cycle. It also helped to identify areas of concern and preference, as well as providing a higher level of recognition for the product adoption at the medical center.

Initially, this evaluation was expected to yield more qualitative than quantitative data. However, the amount of data collected and the large differences in data between the two transport systems provided a significant quantitative difference in transport time and overall satisfaction levels. It is especially interesting that the qualitative comments collected from the transport staff supported these quantitative differences, even though the statistical significance was not anticipated or even suggested at the time of the evaluations. Finally, the use of the Zoom by a single transporter seems to provide such an ease of use that having a partner is not necessary and may even slow down the process.

Moving patients around a medical center is a continuous process. The staff involved in the process is subject to repeated physical stress and is prone to musculoskeletal injuries. A variety of methods to reduce the stress imposed by this physically demanding task have been proposed and implemented. The Zoom stretcher is one such solution. The motorized features of this transport device clearly improve the transport process and offer a substantial reduction in potential injury to transport staff, along with increased efficiency. In a time of reduced staff at all levels in the hospital environment, the Zoom stretcher also offers a solo transporter improved comfort and safety in transporting patients of all sizes.

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