Body Interface Pressure Point Testing And Subjective Comfort/Postural Testing in a Long Term Care Setting

of the Invacare® Matrx® Libra™ Cushion

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Wheelchair Seating in a Long Term Care Setting - User Satisfaction, Pressure Mapping of Libra Cushion

ABSTRACT:

Objective:

This pilot project was conducted to investigate and compare the effects of the Matrx Libra cushion with subjects' current seating cushion in a Long Term Care (LTC) setting.

Subjects (n):

Subject recruitment was led by nursing staff and the director of nursing. Criteria for selection included those at risk of or currently presenting with a pressure injury. Ten subjects were recruited. The study group was heterogeneous (n= 4 male, 6 female).

While a specified age range was not a selection criterion for inclusion, all subjects were 70 years of age or older. All subjects were identified based on nursing care (N= 9 transferred with a mechanical lift, n=4 dependent for mobility, n= 4-foot propulsion, n=2 hand propulsion) and cognitive levels (n= 3 cognitively intact). Subjects were all LTC residents in Canada.

Subjects provided consent with the option to opt out of the study at any stage. Power of Attorneys (POA) were contacted for those subjects who could not provide consent. All parties were informed as to the intent of the study, and that there was no obligation to continue use of the trial cushion after the study.

Primary seating when out of bed was their existing wheelchair with seating. Existing seating had been prescribed by the resident-therapist through government-assisted funding. Age of existing seating ranged between one to four years from date of provision.

Subjects' pre-existing cushions were recorded as n= 4 air floatation, n= 4 contoured foam, n= 1 gel, and n= sling seating upholstery.

Method:

In this case-control study qualitative data was gathered by means of observation and feedback from nursing staff, subjects and /or subject's POA.

No changes were made to the seating components (back supports, additional secondary supports, wheelchair frames) during the study, other than to prevent changes in postural control (e.g.: adjustment of footplate position, back support heights adjusted to accommodate change in the cushion height, seat belts tightened as required).

For the duration of the study, subjects sat on the Matrx Libra cushion, during their waking seated-hours, in accordance with their use of their pre-existing cushion prior to the study.

During the intervention, staff were requested to remove any additional items which may be placed between the subject and the cushion (e.g.: extra sheeting, lift slings).

Quantitative data was obtained through the use of body interface pressure point testing (BodiTrack BT1510), and subjects were mapped without any additional cushion coverings or lift slings.

Each client was transferred and positioned by the investigator and a staff member (when available). A dealer representative assisted with chair set-up as required in order to prevent changes in postural control.

Staff were blinded to the study, as the investigator did not work on-site on a daily basis, in addition a number of staff were not aware that a study was conducted.

Limitations:

During the intervention and mapping staff were requested to remove any additional items which may be placed between the subject and the cushion. However, this was not possible to continuously monitor for consistency for the duration of the study. Items being placed or left in situ (e.g.: lift slings) is often the case in a LTC community setting.

Feedback for the pre and post-intervention was reliant on the LTC staff members, in addition to the subjects themselves and their POA. With regard to the staff feedback, inconsistencies arose during pre- and post-testing due to factors such as staffing hours, shifts and attrition. These are often factors in a LTC community setting.

Client positioning during the intervention period may also have been inconsistent due to the high frequency of staff turnover, levels of involvement, or understanding of the purpose of the intervention – again all factors which are prevalent in a LTC community setting.

Results:

Staff members, subjects and their respective POA were requested to provide feedback.

Results indicated that the Matrx Libra cushion provided to all 10 subjects were equal to or similar in pressure management when compared to their pre-existing cushions (including air flotation). Average and peak pressures were not significantly different. (n= 7 presented with lower peak pressures on the Libra cushion).

The Matrx Libra cushion was rated as a comfortable cushion over the course of the intervention (n= 5 had the ability to provide feedback)

Significant differences were noted as decreased sliding (n= 9), decreased agitation (n=3) and pain (n=4), and an increase reported in both comfort (n= 10) and positioning (n=10, with n= 3 significant improvement reported).

Improved postural support and propulsion (n= 6 in all independent propulsion ability) were also noted on the Matrx Libra cushion when compared to the functional output on the pre-existing cushions.

Conclusion:

Implications for service provision in a LTC setting were identified, which may negatively influence posture and positioning. Staff inconsistencies and attrition, differences in transfers techniques and skill levels, cushion care and maintenance are all real life factors encountered in LTC.

The study concluded that a maintenance-free pressure redistribution cushion provided subjects with consistency in seating (preventing sliding, reduced agitation and pain) while providing improved comfort and pressure redistribution.

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INTRODUCTION:

This report will outline a study conducted in a long term care center, evaluating performance of the Invacare Matrx Libra cushion, specifically user/caregiver feedback, and pressure mapping results in comparison to users originally prescribed product.

The testing was completed during the months of April, May and June 2016. Pressure Mapping was conducted using the BodiTrack BT1510 Pressure Mapping System, (Vista Med, Winnipeg, Canada). The test protocol was followed for testing of ten long term care subjects. The subjects were already seated on a variety of pressure management cushions including contoured foam and air flotation in their existing wheelchairs. Back supports were in place prior to the study and altered if required prior to testing to gain maximal trunk control with the existing cushion/seating system set up. Four clients foot propelled their chairs, two hand propelled and the remaining four were dependent for mobility. The wheelchair set up and sizing was not changed and had not been previously prescribed by this reviewer, and therefore cushion sizing was pre-determined and may or may not have been appropriate for the selected subject. Three clients sat on a 8" x 20" cushion, on a 16" x 18" cushion, two on a 20" x 18" cushion and four on a 18" x 18" cushion. The subjects included four male and six female subjects.

1. Pressure Mapping

Each subject was pressure mapped on their existing cushion and then on the Libra cushion set up for their specific use after assessment of postural concerns. The BodiTrak was screened from the subject vision so as not to impact postural correction. Each subject sat for a minimum of two minutes on each cushion to allow for accommodation of the cushion properties to subject size and pressure.

2. Subjective Evaluation - Subjects

Each subject was asked to rate their original cushion on a scale of 1 – 10 related to comfort (10 most comfortable) and pain (10 least pain). The same criteria were then evaluated following one month of use of the Libra cushion. Three clients were considered sufficiently cognitively intact to provide a reliable rating.

3. Subjective Evaluation – Caregivers

Nursing home staff and family (2) were interviewed with respect to cushion maintenance concerns, ease of transfers on/off the cushion, feeding time, sitting tolerances, sliding issues, agitation and consistency of placing the subject on the cushion. This information was collected regarding the subjects original cushion, and then following one month of use of the Libra cushion. All subjects except one were transferred with a mechanical lift system.

SUBJECT DATA:

1	18" x 20" Flat formed gel	Left heel ulcer	Foot propulsion
2	20" x 18" HP Air Flotation	Past healed wounds	Two hand propulsion
3	18" x 18" Sling seat upholstery	No wounds	Foot propulsion
4	16" x 18" Contoured Foam	Left Ischial redness	Two hand propulsion, limited off-loading due to right hip pain from fracture, decreased cognition for valid answers
5	18" x 18" HP Air Flotation	History of healed ulcers left heel, buttocks, penis, left hip	Dependent for mobility, poor cognition
6	18" x 20" HP Air Flotation	Coccyx ulcer, Left heel ulcer resolved, Right ischial ulcer resolved	Dependent for mobility, limited cognitive capacity
7	18" x 20" Contoured foam	Coccyx and ischial wounds resolved	Foot propulsion, limited cognitive ability
8	18" x 18" HP Air Flotation	Left ischial wound	Foot propulsion
9	18" x 18" Contoured Foam		Dependent for mobility, sites with right leg crossed over left, limited cognitive capacity
10	20" x 18" Contoured Foam		Dependent for mobility, limited cognitive capacity

PROCEDURE:

All pressure measurements were conducted using the same pressure measuring equipment (BodiTrak). The same calibration was used in each test and all testing was completed by the same investigator. Each subject/staff member was asked the same questions for rating comfort and pain reduction and functional use pre and post study.

Measurements were determined to provide pressure readings (mmHg) of:

1. Right and left ischial tuberosities – an average of 4 cell data in the IT area
2. Maximum peak pressures
3. Average pressures

CUSHIONS TESTED:

The pre-test cushions tested included: 4 Air Flotation high profile cushions, 4 contoured foam cushions, 1 formed gel cushion and one subject was not utilizing a cushion sitting directly on the chair upholstery. All cushions were placed on a rigid base on their own chair with a rigid contoured back, except for two subjects who utilized an adjustable tension back support.

The BodiTrak pad was positioned in the same orientation for all subjects. Each subject was requested to sit with their hands their lap in a relaxed pose. Footrest height was adjusted by the investigator for each subject to maximize thigh support and pelvic positioning to an approximate 90 degree hip angle. (Note: due to differences in cushion heights ultimate preferred footrest height was compromised at times). Subjects who foot propelled were positioned with feet on floor, again wheelchair height was an issue to accommodate height changes. It is also noted that during the study period the cushion covers were not removed by staff and therefore they could not comment on the ease of maintenance of the Libra cushion. It is also noted that the staff completing the pre-test questions were not in most circumstances the same staff as those completing post test questions due to staff turnover for shift times. This is a regular occurrence in long term care settings and therefore can be an issue with reporting legitimacy in all aspects of cushion use.

TEST RESULTS:

Pressure Mapping Pre-existing Cushion

Subject	1	2	3	4	5	6	7	8	9	10	AVG.
Right ischial	137	63	18	54.75	56.5	48.75	157.25	44.75	69	50	**69.90**
Left Ischial	112	50.50	43.75	67	88.25	47.5	102.75	48.75	107.5	43.5	**71.15**
Max. peak pressure	178.95	76.02	78.19	78.9	108.56	68.97	205.40	58.04	125.53	75.17	**105.37**
Avg. Pressure	20.48	29.96	20.57	18.33	22.03	12.90	22.35	16.93	22.22	26.74	**21.25**

Pressure Mapping Libra Cushion

Subject	1	2	3	4	5	6	7	8	9	10	Avg.
Right Ischial	92	55.5	34	55.25	73	90.5	108.5	58.5	75	48.25	**69.05**
Left Ischial	94.75	51	41	91.75	81.5	75.25	136.25	58.25	113.5	55.25	**79.85**
Max. peak pressure	140.64	58.02	51.05	101.95	124.48	131.59	176.68	75.62	143.55	84.71	**108.83**
Avg. Pressure	18.08	27.24	22.47	18.95	13.64	13.12	20.23	15.53	19.48	23.54	**19.23**

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Subjective Analysis Pre-existing Cushion

Subject	1	2	3	4	5	6	7	8	9	10
Comfort	10	2	4	2	*	*	*	5	*	*
Pain	1	10	5	2	*	*	*	5	*	*
Ease of transfers	8	10	5	10	1	3	10	10	10	10
Consistency of placement on cushion	8	10	3	10	2/3	3	10	5	10	3
Frequency of sliding (x per day)	0	1	10+	2	10	1	2	5	0	1
Postural ease for eating/feeding	10	10	10	10	5	10	10	5	10	10
Level of agitation (1-least)	1	8	1	5	10	1	1	1	9/10	8
Ease of positioning of cushion in chair	8	8	0	10	3	10	10	10	10	10
Maintenance of cushion/covers	8	2	0	10	3	10	10	10	10	10
Propulsion capacity	10	10	3	8	0	0	10	5	0	0
Sitting tolerance (hrs)	2	5	12	4	5	2	5	5	5	10

Subjective Analysis Libra Cushion

Subject	1	2	3	4	5	6	7	8	9	10
Positioning pieces added	0	L ob.	L lat wedge	0	Fluid L, R lat wedge	Extra fluid L & R	0	0	L lat wedge	0
Comfort	10	4	7/8	5	*	*	*	10	*	*
Pain	1	9	1	8	*	*	*	1	*	*
Ease of transfers	8	10	10	10	1	3	10	10	10	10
Consistency of placement on cushion	8	9	10	10	5/6	10	10	10	10	6
Frequency of sliding (times per day)	0	0	0	2	8	0	0	1	0	0
Postural ease for eating/feeding	10	10	10	10	5	10	10	10	10	10
Level of agitation (1-least)	1	8	1	5	3	1	1	1	1	5
Ease of positioning of cushion in chair	8	9/10	10	10	10	10	10	10	10	10
Maintenance of cushion/covers	*	*	Incontinent cover given	*	*	*	*	*	*	*
Propulsion capacity	10	10	10	8	0	0	10	10	0	0
Sitting tolerance (hrs)	2	5	12	4	5	2	5	5	5	10

Subjective evaluation by Subjects: Scale 1–10
1= poor/worst/hard/least 10= excellent/best/most/easy *unable to answer

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SUMMARY:

At the end of the study all subjects or families/staff were questioned as to whether or not they would like the new Libra cushion to be left with the subject. All subjects requested that the cushion be left for comfort and positioning.

From these findings, it can be concluded that the Libra cushion does provide as good or similar pressure management to subjects pre-existing cushions, including air flotation. Average and peak pressures were not significantly different. The Libra cushion was rated as a comfortable cushion over a 3-4 week time frame, with the most significant difference noted being decreased sliding, agitation, and pain, and increased comfort and positioning. Improved postural support and propulsion were also noted on the Libra cushion.

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