Pressures to Bony Prominences in Lateral Turned Position

Comparison of Pressure Reduction Achieved by Support Device Used

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BACKGROUND

The primary intention of turning and repositioning is to reduce pressure to the sacral/coccyx area. It can only be effective to reduce PI risk when the turned position is supported such that there is adequate and sustained pressure relief from the sacrum/coccyx area

The true pressure on the sacral/coccyx region in a 30 degree lateral turned position is not well explored. There is likely a significant variation of pressures over time depending on the "quality" of the turn and the support device used.

In this study we explore sacral pressures as measured by the most common support devices used to support the position.

OBJECTIVES

We compare functional capacity of each of 4 devices to achieve 3 variables that are most important for pressure reduction;

- The actual angle of turned position achieved
- The level of pressure reduction achieved
- Subjective comfort as a measure of probability to keep position

METHODS

- We measured a volunteer subject with a history of Quadriplegic Spinal Cord Injury. The subject is male, 5'11", and weighs 79kg
- Subject was on a Linet Protevo GTE low air mattress with MCM and TurnAssist ® frame technology
- The subject was supported in side lateral turn position using each of 4 different support devices listed in materials section
- We measured pressures to bony prominences of the sacrum, the scapula and buttocks on the supported side, and the trochanter and acromion process opposite the supported side.
- We asked the subject to report relative comfort of each device.
- The average of all pressures recorded is calculated to surmise overall performance.

MATERIALS

The Juzo Pressure Monitor
Used to measure pressures
(Juzo, Cuyahoga Falls, OH)

Measures direct pressures in mmHg

Applied directly to each bony prominence

The Levogage Angle Measure was used to measure body angle in turned position from sternum and pubic bone (Sun Company, CO)

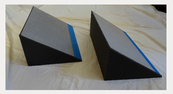
COMPARED SUPPORT DEVICES

We tested a representative sample of devices typically used for supporting a turned position

Standard Hospital Pillows

Standard wedge

BackBone wedge

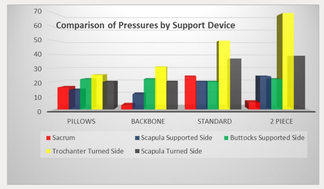


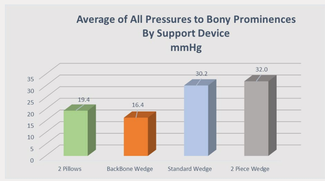
2 piece wedge

RESULTS

Pressures, angles and comfort turned position varied by device

- Pressures to sacrum in turned position ranged from as low as 3mmHg (BackBone) to as high at 24mmHg (Standard Wedge)
- Pressures to other bony prominences were affected by the firmness of the device and the degree of turned angle

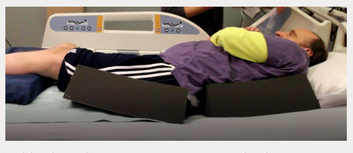




2 Pillows	
Average of all Pressures	19.4mmHg
Sacral Pressure	24mmHg
Trochanter Pressure	25mmHg
Angle at Chest	<30^0
Angle at Pelvis	15^0
Comfort Level	3

BackBone Wedge	
Average of all Pressures	17.4mmHg
Sacral Pressure	3mmHg
Trochanter Pressure	31mmHg
Angle at Chest	>30^0
Angle at Pelvis	15^0
Comfort Level	4

Standard Wedge	
Average of all Pressures	30.2mmHg
Sacral Pressure	24mmHg
Trochanter Pressure	50mmHg
Angle at Chest	>45^0
Angle at Pelvis	30^0
Comfort Level	7



2 Piece Wedge	
Average of all Pressures	32mmHg
Sacral Pressure	5mmHg
Trochanter Pressure	70mmHg
Angle at Chest	>45^0
Angle at Pelvis	30^0
Comfort Level	9

- All devices supported the upper torso by at least 15 degrees greater angle than the pelvis
- The foam wedges "cut" to 30 degrees angles supported the subject at a torso angle greater than 45 degrees.
- Higher turn angles and firmness were associated with intolerable discomfort.
- A 30 degree pelvic angle caused excessive pressures to the trochanter in all cases

RESULTS (Cont)

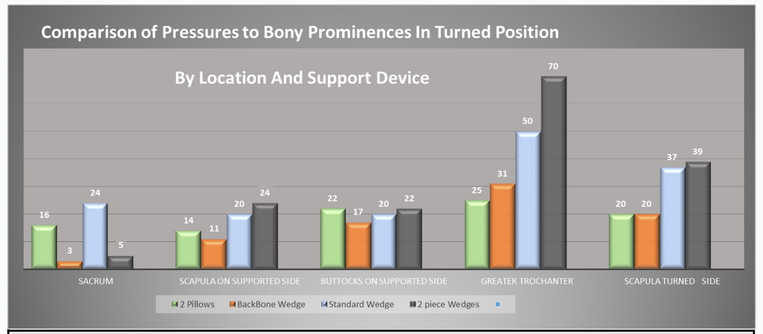


Table 1
Pressures on Bony Prominences in Lateral Turned Position By Support Device in mmHg

	Sacrum	Scapula on Supported Side	Buttocks on Supported Side	Greater Trochanter	Scapula Turned Side	Avg of All Pressures	Comfort Scale 0 = no discomfort 10 = Unbearable	Chest Angle	Pelvis Angle
2 Pillows	**16**	14	22	25	20	**19.4**	3	30^0	15^0
BackBone Wedge	**3**	11	17	31	20	**16.4**	4	30^0	15^0
Standard Wedge	**24**	20	20	50	37	**30.2**	7	>45^0	30^0
2 piece Wedges	**5**	24	22	70	39	**32**	9	>45^0	30^0

CONCLUSIONS

- The level of pressure reduction in lateral turned position varies dramatically depending on the device used and the angle of the turn.
- Best overall pressure reduction was achieved by the crescent shaped wedge The BackBone as measured by calculating the average of all pressures
- Triangle shaped wedges angled at 30 degrees support the torso to 45 degrees or greater and the pelvis to 30 degrees or greater. This angle of turn places excessive pressure the trochanter and puts the patient in an ergonomically uncomfortable position
- Comfort is significant predictor of effectiveness and stability.

IMPLICATIONS & Future Studies

- Variability of pressures to bony prominences and turn angles achieved are likely to change greatly over time. Important considerations are stability, level of immersion, distribution of pressure, angle of turn, head of bed angle, and sliding.
- Future study to measure the capacity of each support device to maintain adequate support and pressure reduction over time is warranted.
- Additional exploration into how physical movement, physiologic conditions and patient comfort affect position and pressure reduction would be highly contributive to improving the practice of turning.
- Comparing pressures and performance of positioning support devices on standard mattress surfaces could provide helpful information toward reducing as community acquired pressure injury.

References

Please see attached reference list

Disclosure: The crescent shaped wedge, "The BackBone™ was designed by Gwen Jewell, Clinical II RN, BSN for the purpose of creating a better functioning lateral support device. No funding was received for this study. The BackBone™ is patented.