Evaluating the Impact of a true Automatic Active Dynamic Support Surface on Pressure Ulcer Management in a Long Term Care Setting.

1 Introduction

A 61 bedded care home from the Barchester Healthcare estate which specialises in Nursing Dementia, Nursing, Palliative, Parkinson's and Respite care, along with numerous other services was chosen to conduct this study due to the residents' complexities.

The care home had a variety of active dynamic mattresses in use across the site including manual systems and semi dynamic systems. Active dynamic mattresses are essential in pressure ulcer prevention and treatment, but many require manual patient weight adjustments. Errors in these settings can result in resident/patient injury.

This study evaluates the effectiveness of an innovative mattress that automatically adjusts to the patient's weight, reducing the potential for human error in setting adjustments. A review of automatic dynamic air mattresses that are Class 2a within the market place in the UK, directed us to evaluate a new active fully automatic mattress. This new system had a low profile cell height of 15cm compared to the traditional deep cell mattresses within the market place.

A four week study was commenced, involving eight elderly residents with multiple complex health profiles, including incontinence, immobility, Parkinson's disease and a history of pressure ulcers. Over the four-week period, the study assessed outcomes related to pressure ulcer healing rates, incidence of new ulcer formation, and resident/patient reported comfort levels, (important due to ongoing resident compliancy issues with residents using current active dynamic air support surfaces).

2 Methods

New Active Dynamic air systems were all installed and set up on the same day, with the old systems being removed. Every resident involved in the evaluation had a full clinical assessment on the day of he installation and photographic evidence was taken of those that had existing Pressure Ulcers. Each resident had a person centered care plan developed incorporating the features of the new fully automatic active dynamic mattress.

Once the systems were fully inflated and had gone through a full alternating cell cycle, each system was adjusted to the comfort setting to each resident to ensure optimum comfort.

Throughout the four-week period, the support surface remained in the default alternating mode, with comfort settings adjusted as needed. This was verified by the systems unique history of use download system which provided evidence of how long the mattresses were in alternating mode over the four week period. Each week the data was downloaded although it has a 28 day recording cycle. The history of use demonstrated that the system automatic adjustment was evidenced on each of the residents and that it remained in full alternation mode. The history of use demonstrated that no faults occurred during the evaluation period and it identified how many hours the system ran for and if it was turned off at any stage.

Eight residents, including three with pre-existing pressure ulcers, participated. Weekly assessments using standard grading scales tracked pressure ulcer status. Feedback from residents and caregivers on comfort, ease of use, and well-being improvements were collected. The study also monitored any new pressure ulcers and changes in existing conditions, providing valuable insights into resident outcomes and ease of use for the end user.

3 Results

- **Pressure Ulcer Healing:** 75% (6 out of 8 residents) showed improvement or remained stable. Specifically, among the subgroup with existing pressure ulcers, 66% (2 out of 3 residents) exhibited healing.
- **New Ulcer Formation:** A minimal incidence (12.5%) of new ulcers was reported, with only (1 resident who was end of life) experiencing deterioration.
- **Comfort:** All residents rated the support surface 9 out of 10 or higher for comfort, with unanimous approval for the pumps, quiet operation. Compared to original pumps.
- **Clinician Feedback:** Clinicians unanimously found the pump easy to use and the control panel very intuitive, the support surface easy to maintain, with no incidents of strike-through reported on support surface covers.
- Due to the low profile cell design of the support surfaces all of the residents in the bed met the IEC 60601-2-52 bed standard. The low profile cell height of 15cm compared to the traditional deep cell mattress. The system ensured that 22cm(220mm) above the support surface of the mattress delivered compliance and more importantly resident safety compared to the traditional deep cell dynamic air cells.The compliancy delivered a cost saving of approximatly one thousand pound, as 4 out of the 8 residents where bed bound and extra heigh bed rail extensions would of been required.

4 Discussion

The study supports previous research demonstrating the benefits of fully automatic systems in pressure ulcer management [4, 5]. The mattress's ability to prevent new ulcers and enhance patient comfort aligns with healthcare guidelines [1, 2]. The reduced incidence of new ulcers and positive patient feedback highlight the system's effectiveness in improving clinical outcomes, consistent with the best practices in pressure ulcer prevention [3]. The study raises the question as to whether dynamic systems can aid in the recording and validation of repositioning whether it be through self-positioning or the delivery of care!

5 Conclusions

Traditionally, active support surfaces required manual adjustments by clinicians based on the resident's weight. This method was labor-intensive, subjective and error-prone along with inconsistencies in paperwork.

The automatic dynamic air support surface addresses these challenges with an automatic adjustment algorithm, ensuring optimal pressure distribution and comfort without manual intervention. Clinically validated, a study published in the Journal of Wound Care (2019) demonstrated significant improvements in blood flow and health among users. This small study further confirms the support surface's effectiveness in managing pressure ulcers and enhancing resident comfort. Positive feedback from residents and clinicians underscores the support surface's pivotal role in advancing care practices.

The introduction of a fully automatic dynamic air support surface in a long term care setting significantly improved pressure ulcer management in very high-risk residents/patients and for those with category four tissue damage. The mattress proved effective in promoting healing, preventing new ulcers, and enhancing patient comfort. These results emphasize the importance of advanced mattress technology in improving patient care and adhering to healthcare standards [1, 2].

In this study, the fully automatic dynamic air support surface showed promising results in managing pressure ulcers and enhancing resident comfort in complex long term care settings. With 75% of residents exhibiting healing or stable conditions and minimal incidence of new ulcer formation (12.5%), the support surface proved effective in preventing further deterioration whilst ensuring compliancy with the IEC60601-2-52 bed rail regulations. Additionally, residents rated the support surface highly for comfort, highlighting its positive impact on well-being.

A further study is to be conducted over a three month period, where digital care records that identify repositioning will be compared to the dynamic system reporting to ascertain the accuracy, along with the difference in time on residents self movement. The second part of the study is due to be commenced end of November.

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Example download

	Event	Date & Time (UK GMT)
53	**Power On**	7/6/2024 11:4 38
54	Control Panel-Locked	7/6/2024 11:5 43
55	Alternating Mode-On	7/6/2024 11:31 11
56	Level 1	7/6/2024 11:31 11
57	Ready For Use	7/6/2024 11:31 11
58	**Level 2**	7/6/2024 12:34 32
59	Ready For Use	7/6/2024 12:34 32
60	Alternating Mode-On	7/6/2024 12:34 32
61	Control Panel-Unlocked	10/6/2024 7:6 46
62	**Autofirm Repositioning Mode-On**	10/6/2024 7:6 53
63	Control Panel-Locked	10/6/2024 7:7 52
64	Control Panel-Unlocked	10/6/2024 7:17 51
65	Alternating Mode-On	10/6/2024 7:17 53
66	Control Panel-Locked	10/6/2024 7:18 53
67	Control Panel-Unlocked	10/6/2024 9:6 53
68	**Autofirm Repositioning Mode-On**	10/6/2024 9:7 11
69	Control Panel-Locked	10/6/2024 9:8 10
70	Control Panel-Unlocked	10/6/2024 9:17 49
71	Alternating Mode-On	10/6/2024 9:17 51
72	Control Panel-Locked	10/6/2024 9:18 50
73	Control Panel-Unlocked	10/6/2024 11:6 45
74	Autofirm Repositioning Mode-On	10/6/2024 11:6 47
75	Control Panel-Locked	10/6/2024 11:7 46
76	Control Panel-Unlocked	10/6/2024 11:17 46
77	Alternating Mode-On	10/6/2024 11:17 47
78	Control Panel-Locked	10/6/2024 11:18 46
79	Control Panel-Unlocked	10/6/2024 13:7 26
80	**Autofirm Repositioning Mode-On**	10/6/2024 13:7 27
81	Control Panel-Locked	10/6/2024 13:8 27
82	Control Panel-Unlocked	10/6/2024 13:18 16
83	Alternating Mode-On	10/6/2024 13:18 17
84	Control Panel-Locked	10/6/2024 13:19 16
85	Control Panel-Unlocked	10/6/2024 15:12 52
86	**Autofirm Repositioning Mode-On**	10/6/2024 15:12 53
87	Control Panel-Locked	10/6/2024 15:13 53
88	Control Panel-Unlocked	10/6/2024 15:23 16
89	Alternating Mode-On	10/6/2024 15:23 16
90	Control Panel-Locked	10/6/2024 15:24 15
91	Control Panel-Unlocked	10/6/2024 17:7 47

	Event	Date & Time (UK GMT)
92	**Autofirm Repositioning Mode-On**	10/6/2024 17:7 48
93	Control Panel-Locked	10/6/2024 17:8 48
94	Control Panel-Unlocked	10/6/2024 17:17 46
95	Alternating Mode-On	10/6/2024 17:17 47
96	Control Panel-Locked	10/6/2024 17:18 46
97	Control Panel-Unlocked	11/6/2024 7:7 58
98	Control Panel-Locked	11/6/2024 7:8 36
99	Control Panel-Unlocked	11/6/2024 7:8 40
100	**Autofirm Repositioning Mode-On**	11/6/2024 7:9 56
101	Control Panel-Locked	11/6/2024 7:10 56
102	Autofirm Mode-Auto Off	11/6/2024 7:30 0
103	Alternating Mode-On	11/6/2024 7:30 0
104	Control Panel-Unlocked	11/6/2024 9:7 55
105	**Autofirm Repositioning Mode-On**	11/6/2024 9:7 56
106	Control Panel-Locked	11/6/2024 9:8 56
107	Autofirm Mode-Auto Off	11/6/2024 9:28 29
108	Alternating Mode-On	11/6/2024 9:28 29
109	Control Panel-Unlocked	11/6/2024 11:7 37
110	**Autofirm Repositioning Mode-On**	11/6/2024 11:7 38
111	Control Panel-Locked	11/6/2024 11:8 37
112	Autofirm Mode-Auto Off	11/6/2024 11:28 12
113	Alternating Mode-On	11/6/2024 11:28 12
114	Control Panel-Unlocked	11/6/2024 13:7 5
115	**Autofirm Repositioning Mode-On**	11/6/2024 13:7 6
116	Control Panel-Locked	11/6/2024 13:8 6
117	Alternating Mode-On	11/6/2024 13:27 31
118	Autofirm Mode-Auto Off	11/6/2024 13:27 31
119	Control Panel-Unlocked	11/6/2024 15:7 57
120	Autofirm Mode-On	11/6/2024 15:7 59
121	Autofirm Mode-Auto Off	11/6/2024 15:8 0
122	**Autofirm Repositioning Mode-On**	11/6/2024 15:8 7
123	Control Panel-Locked	11/6/2024 15:9 6
124	Autofirm Mode-Auto Off	11/6/2024 15:28 23
125	Alternating Mode-On	11/6/2024 15:28 23
126	Control Panel-Unlocked	11/6/2024 17:7 22
127	**Autofirm Repositioning Mode-On**	11/6/2024 17:7 23
128	Control Panel-Locked	11/6/2024 17:8 22
129	Autofirm Mode-Auto Off	11/6/2024 17:27 47
130	Alternating Mode-On	11/6/2024 17:27 47

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