DHG
Moving Health Forward

WHITE PAPER

Does Washing Slide Sheets Impact Their Level of Friction?:

A Comparison of Three Slide Sheets to Assess Whether Their Properties of Low Friction are Preserved After Washing

Clinical Context

Sliding sheets provide a simple, yet essential solution in the day-to-day moving and handling of patients, acting as a friction reducing material to enable the repositioning of a patient up and down the bed, laterally between two surfaces, i.e. bed to bed, or helping to turn the patient. The reduced friction and shearing forces provided by the slide sheets provide two primary benefits:

1. Reducing the risk of tissue injury that can occur through excessive friction and shear forces

2. Reducing the force and effort required by a caregiver to complete a moving and handling task

The latter benefit remains of significant importance to the clinical setting. Work-related musculoskeletal disorders remain one of the largest drivers of healthcare worker absenteeism, with the moving and handling of patients remaining the largest risk factor. As high as 79.7% of healthcare personnel have reported musculoskeletal complaints in some part of their body[1] leading to an average of 18 days a year of musculoskeletal related sickness absence per healthcare emplpoyee.[2]

However, the correct use of simple sliding sheets in patient care has been demonstrated to be an effective solution in reducing musculoskeletal complaints in the neck, arms, shoulders, hands, and lower back, as well as increasing overall job satisfaction.[3]

Whilst there are several types of slide sheet systems available to clinicians, slide sheets are commonly either disposable for single-patient use, or reusable through laundering. Launderable slide sheets are typically more cost effective.

To date, there has been little evidence looking into the impact that laundering slide sheets has on the low friction properties that are essential to their clinical function.

Within this study, two slide sheet systems and a cotton sheet control have been compared for both their co-efficient of friction and average force of friction. To simulate different usage patterns, the sheets were tested at 0, 10 and 30 machine washing and drying cycles. To simulate different climates, the materials were conditioned in an environmental room with temperatures at 20°C and 30°C, and humidity variations of 30%, 45%, and 60%.

The slide sheet systems tested were DHG's WendyLett slide sheets, and the slide sheets from another global provider, herein referred to as Slide Sheet 2. All the slide sheets are made from satin (polyester).

Methodology

Both the co-efficient of friction (CoF) and the average force of friction measurements followed the direction of the European Standard EN 14882:2005 Rubber or Plastic Coated Fabrics - Determination of the Static and Dynamic Co-efficient of Friction. Testing was performed on a calibrated AML Tensile Tester.

To perform this test, a sled is placed upon the cut fabric (two different directions of cut fabric). The test path is 400mm long and the sled is pulled at 500mm/min. The test is carried out within 5 seconds of the sled being placed. The testing set ups can be seen in figures 1 through 3, below.

The tested sliding sheets were cut into 3 equal pieces, where one piece remained unwashed, one piece was washed/dried for ten cycles, and one piece was washed/dried for 30 cycles. The washing/drying cycle was kept constant, and consisted of a washing cycle of 1 hour and 6 minutes at 60°C with a normal dosage of washing detergent, and a drying cycle at medium high temperature for 27 minutes.

Testing for material conditioning was also performed where by the following combinations were conditioned in an environmental chamber for 16 hours:

- 20°C, 30% humidity
- 30°C, 30% humidity
- 20°C, 60% humidity
- 30°C, 60% humidity
- 20°C, 45% humidity (wet fabric)

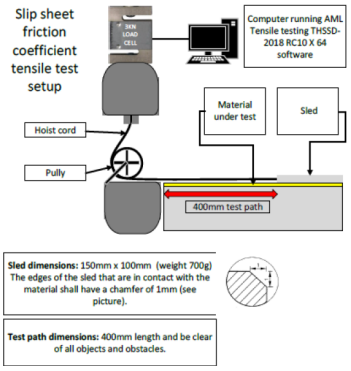

Figure 1. Tensile tester setup, sliding sheets

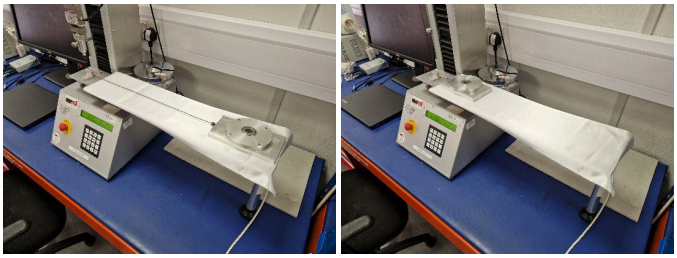

Figure 3. Tensile tester, start and end positions

Results

Total testing consisted of 3 different materials and 7 different tests, where the ambient temperature and the humidity are the changing factor.

Control

The cotton sheet, which was used as a control, has on average up to 5x higher average force of friction (1.35N) and up to 4x higher CoF (0.20N).

Average Force of Friction

The average force of friction for WendyLett slide sheets and Slide Sheet 2 was tested at all environmental conditions unwashed, following 10 wash/dry cycles, and following 30 wash/dry cycles. The results are presented in figures 4, 5, and 6 on the following page.

For WendyLett, the average of the average force of friction across all environmental conditions are as follows per wash cycles:

WendyLett unwashed = 0.35N
WendyLett 10 wash/dry cycles = 0.23N
WendyLett 30 wash/dry cycles = 0.14N

For Slide Sheet 2 the average of the average force of friction across all environmental conditions are as follows per wash cycles:

Slide Sheet 2 unwashed = 0.29N
Slide Sheet 2 10 wash/dry cycles = 0.12N
Slide Sheet 2 30 wash/dry cycles = 0.3N

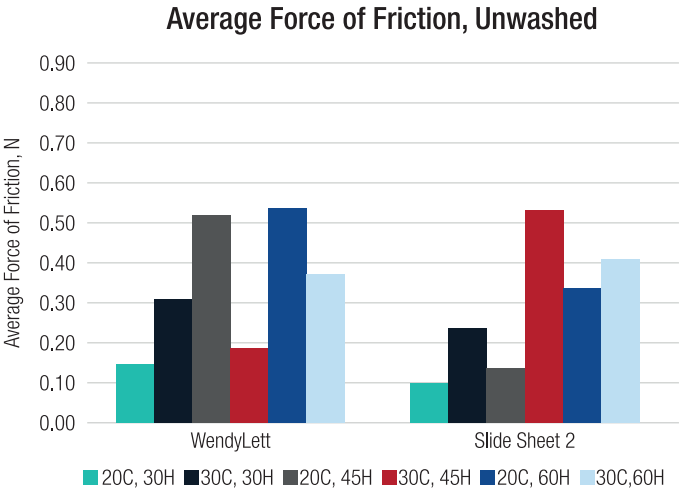

Figure 4. Average force of friction, unwashed fabric

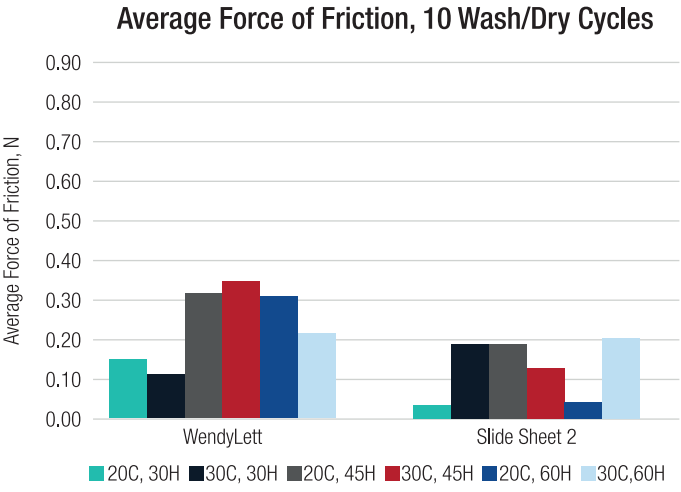

Figure 5. Average force of friction, 10 wash/dry cycles

Co-Efficient of Friction (CoF)

The CoF for WendyLett slide sheets and Slide Sheet 2 was tested at all environmental conditions unwashed, following 10 wash/dry cycles, and following 30 wash/dry cycles. The results are presented in figures 7, 8 and 9 on the following page.

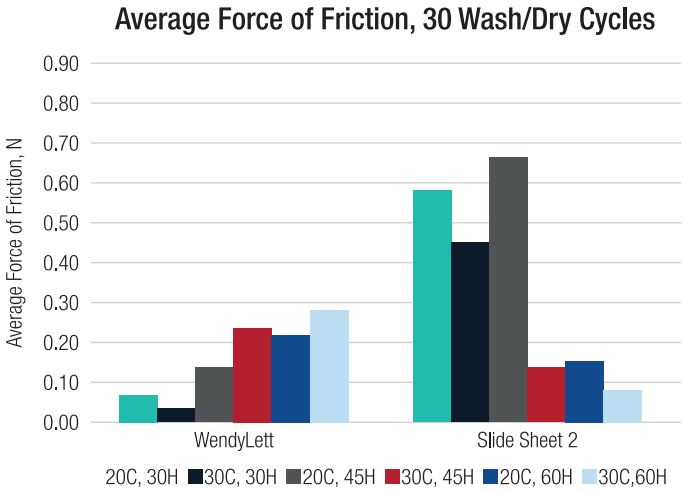

Figure 6. Average force of friction, 30 wash/dry cycles

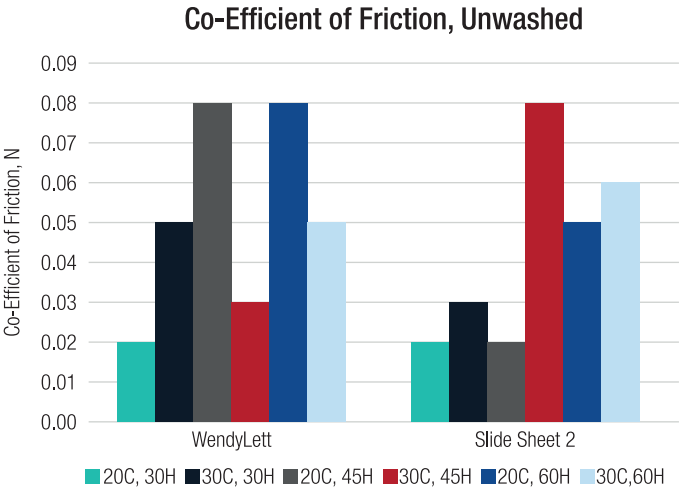

Figure 7. Co-efficient of friction, unwashed

For WendyLett, the average CoF across all environmental conditions are as follows per wash cycles:

WendyLett unwashed = 0.05N
WendyLett 10 wash/dry cycles = 0.03N
WendyLett 30 wash/dry cycles = 0.02N

For Slide Sheet 2, the average CoF across all environmental conditions are as follows per wash cycles:

Slide Sheet 2 unwashed = 0.04N
Slide Sheet 2 10 wash/dry cycles = 0.02N
Slide Sheet 2 30 wash/dry cycles = 0.05N

Discussion

This study demonstrates the impact that washing cycles can have on the friction of slide sheets. Through all washing cycles, the WendyLett slide sheets retain or improve both their average force of friction and their co-efficient of friction.
Conversely, Slide Sheet 2 sees a detrimental impact to both the average force of friction and the co-efficient of friction upon 30 wash/dry cycles. This may be because other slide sheets are coated to improve initial friction which then becomes degraded and lost as the slide sheet is laundered over its lifetime.
Therefore, as the loss of friction occurs over time, these slide sheets may begin to increase the force required to move and handle patients. It is of clinical importance that the quality and functionality of a slide sheet is retained across is usable life.

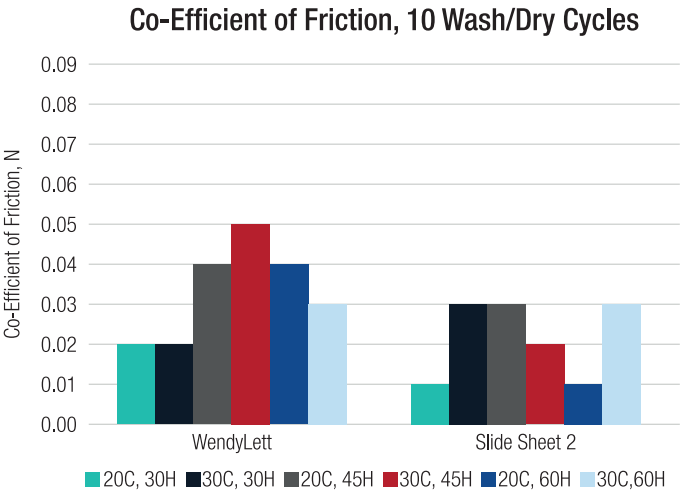

Figure 8. Co-efficient of friction, 10 wash/dry cycles

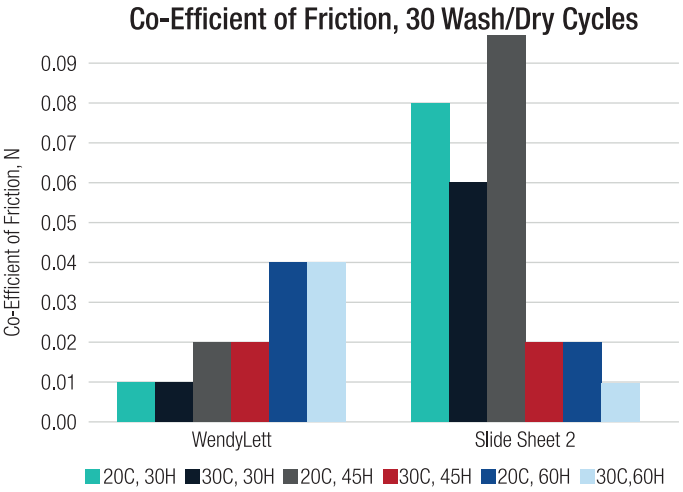

Figure 9. Co-efficient of friction, 30 wash/dry cycles

REFERENCES

1. Koyuncu, N., & Karcioglu, O. (2018). Musculoskeletal Complaints in Healthcare Personnel in Hospital: An Interdepartmental, Cross-Sectional Comparison. *Medicine (Baltimore)*. 97(40):e12597.

2. NHS Employers. (2022). Musculoskeletal Health in the Workplace. Accessible online at: https://www.nhsemployers.org/articles/musculoskeletal-health-workplace

3. Alperovitch-Najenson, D., Weiner, C., Ribak, J., & Kalichman, L. (2020). Sliding Sheet Use in Nursing Practice: An Intervention Study. *Workplace Health Saf.* 68(4):171-181.

DHG
Withey Court, Western Industrial Estate, Caerphilly, CF83 1BF
T: +44 (0) 800 043 0881
E: info@directhealthcaregroup.com
www.dhg-healthcare.com