CleanPatch- Uniaxial Fatigue and Wear Test
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Background
Hospital acquired infections (HAI) are infections that patients acquire during the course of receiving healthcare treatment for other conditions; these infections can be devastating and even deadly. Environmental surfaces in hospitals are a common source of pathogens which can cause HAI, and microbiological surveys have demonstrated that many hospital surfaces (bed mattresses, stretchers, etc.) are contaminated with potentially dangerous pathogens. CleanPatch was engineered by Surface Medical Inc. to restore surfaces of damaged bed mattresses and stretchers to an intact and hygienic state prior to patient exposure. A durability test was developed to simulate patient movement and cleaning regimens found in hospital settings. This evaluates CleanPatch’s performance and resistance to bodily fluids and chemical cleaners.

Experiment Design
Zymetrix designed a custom uniaxial fatigue and wear test to evaluate the performance of CleanPatch by creating an environment that simulates 4 to 6 months of terminal cleaning and wear. CleanPatch was applied over a one inch tear on a hospital mattress which was then secured to the BOSE ElectroForce 3500 Uniaxial machine. A custom compression plate mimicking adult anatomy was manufactured and installed to apply uniaxial pressure (1” compression) and rotation (90° from zero in CW and CCW direction). In addition, artificial urine and quaternary ammonium cleaning solution (Benzalkonium Chloride, 516 ppm) was applied to simulate body fluid exposure and routine cleaning. Finally, a water leak test adopted from the National Health Service (UK) was used to evaluate the ability of CleanPatch to seal the tear during the course of the uniaxial testing.

Results
Over 2,800 compression and rotation cycles, as well as 16 artificial urine treatments and 16 cleaning regimens were applied to CleanPatch, simulating up to 6 months of hospital use. No physical changes (lift, peel, wrinkle, discoloration) were observed. No water leaked past the damaged area before, during and after the test.

Conclusion
CleanPatch did not show any sign of wear in a simulated hospital environment.

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<tr>
<th>CleanPatch</th>
<th>No Peeling</th>
<th>No Lifting</th>
<th>No Water Leakage</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="CleanPatch" /></td>
<td><img src="image2.png" alt="Checkmark" /></td>
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