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Determining the Saturation Point, Rate of Absorption, and Closure Efficacy of Absorbent Containing Plastic Liners for Bed Pans and Commodes

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Cleanwaste® Research and Development

Background

Handling human excrement can be both difficult and hazardous. Waste is typically deposited directly into commodes, bedpans, etc. posing hazards in transport and disposal.[1,4] The waste receptacle must then be thoroughly cleaned to avoid the spread of pathogens.[2,3] A plastic liner inserted into a commode or bedpan can be used to facilitate safe transport, disposal, and cleanup. There are several brands of plastic liners available today such as the CLEANWASTE SANI-BAG+® (see Figure 1 below). Many of these liners contain an absorbent pad or powder. These absorbents are present to take up any liquids associated with human waste, specifically urine or loose stool. If the absorbent cannot adequately retain liquid waste, the hazards of transporting, disposal, and cleanup remain present and can lead to contact with or transmission of dangerous pathogens. In addition to the absorbent, the closure systems of the plastic liners may provide an additional protective barrier against pathogens. The closure system must be able to effectively seal off all harmful pathogens from the outside environment.[5]

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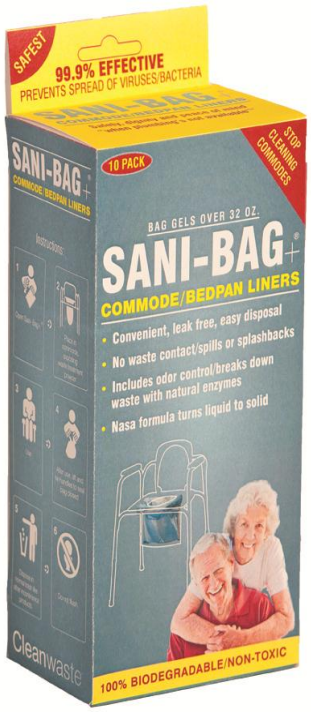

Figure 1 - CLEANWASTE SANI-BAG+®

Purpose

The CLEANWASTE SANI-BAG+® and BAG X were tested in order to determine how much hazardous waste they can retain, how quickly they can retain the waste, and how effective the closure system is at sealing off the waste so as to provide safe transport and disposal.

Materials

CLEANWASTE SANI-BAG+® – The most sanitary, safe, environmentally-friendly solution available. SANI-BAG+® contains a NASA-developed gelling agent, complete with a proprietary blend of natural enzymes, decay catalysts and deodorizing agents that traps and encapsulates liquid and solid waste preventing splash backs, spills, and contact with waste. Caregivers can tie and toss in normal household trash, with no cleanup.

BAG X – Single use bags, containing a super-absorbent pad. The bag can be used in bedpans or commode chair pails. It is disposed of by picking it up by the pull ties and tying it shut.

Experiment 1: Saturation Point

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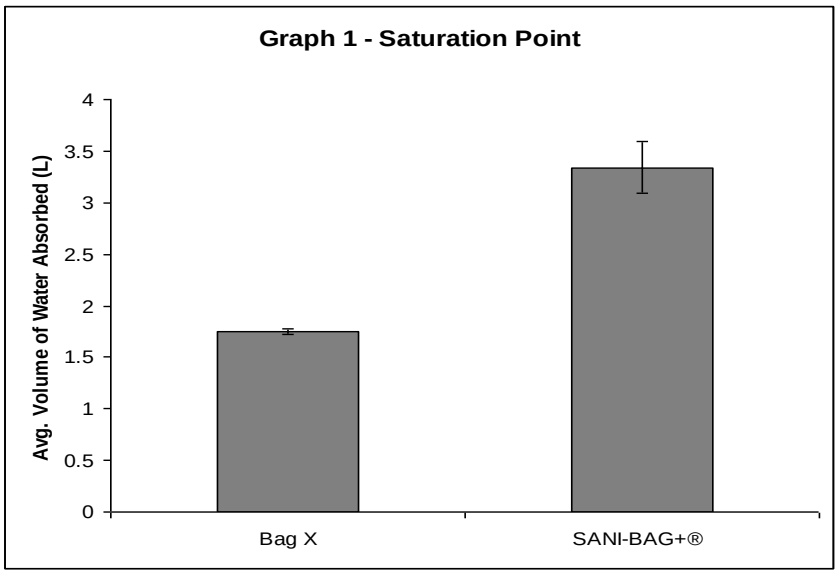
In order to determine differences in the saturation point (an indication of maximum absorbance capacity) between the CLEANWASTE SANI-BAG+® and BAG X, five replications of each were arranged in a completely randomized design. Five each of the CLEANWASTE SANI-BAG+® and five each of the BAG X were placed into separate commodes. Each liner was treated with 3.785 L (one gallon) of 98 °F tap water. After one hour, the contents of each liner were placed into an ASTM US size 7 sieve and any unabsorbed water that passed through the sieve was measured. The CLEANWASTE SANI-BAG+® absorbed, on average, 3.342 L of water. Significantly more than the average absorbance of 1.735 L for BAG X (see Graph 1 below). The CLEANWASTE SANI-BAG+® absorbs nearly 53% more liquid than BAG X.



Experiment 2: Rate of Absorption

To determine the difference in the rate of absorption between the CLEANWASTE SANI-BAG+® and BAG X, 98 °F tap water was added to each system in 8 ounce increments. The system was then inverted and the time point at which no spilled liquid could be observed was recorded. The system was then reverted and an additional 8 ounces of water was added. There were 5 replications of each system arranged in a completely randomized block design. The process was repeated until a total of 48 ounces of water had been added to each system. BAG X took significantly longer to absorb the added water at each 8 ounce addition than did the CLEANWASTE SANI-BAG+® (see Graph 2 below). Overall, the absorbent contained in the CLEANWASTE SANI-BAG+® proved to be at least 6x faster than BAG X at absorbing 48 ounces of water.

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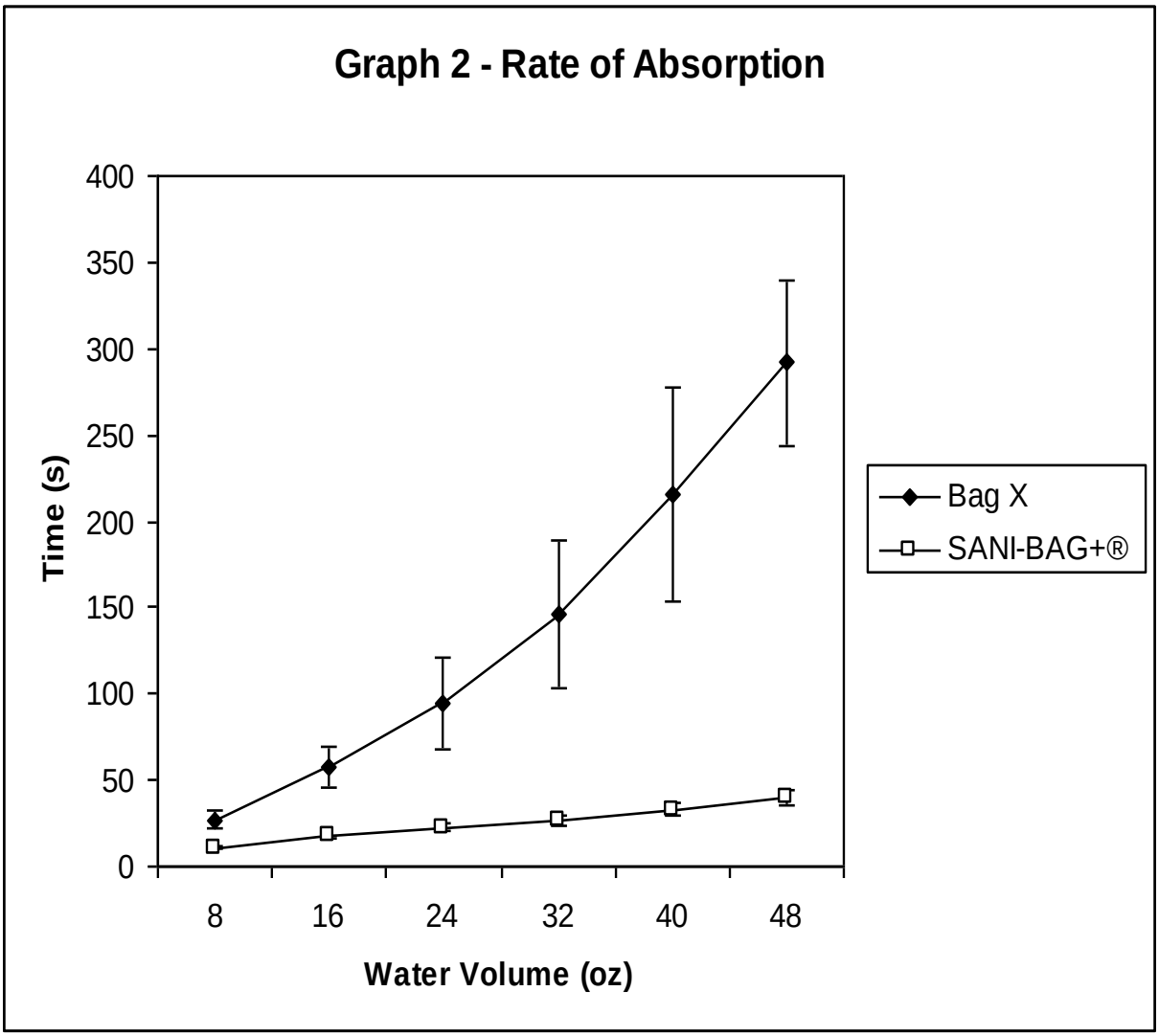

Experiment 3: Efficacy of Sealing System

In order to evaluate the efficacy of the closure system for both the CLEANWASTE SANI-BAG+® and BAG X, the liners were placed into separate commodes and 64 ounces of 98 °F tap water was added to each system. After one hour, the liners were sealed as per the manufacturer's instructions. The liners were then inverted and any loss of liquid and/or absorbent resulted in a FAIL while the retention of all liquid and/or absorbent resulted in a PASS. There were five replications of each system in a completely randomized design.

When inverted, all five of the BAG Xs immediately leaked liquid, as opposed to all five of the CLEANWASTE SANI-BAG+® which retained all of their contents. However, due to the fact that 64 ounces

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of water is beyond the saturation point of BAG X, the experiment was repeated with adding only 32 ounces of water in order to prove that content retention was due to closure efficacy and not the degree of media saturation. Even when adding half the amount of fluid, all five of the BAG X liners, which utilize the pull tie system, immediately FAILED when inverted. The CLEANWASTE SANI-BAG+® once again PASSED and retained all contents when inverted.

Conclusion

We conclude that the CLEANWASTE SANI-BAG+® is superior to BAG X.

The CLEANWASTE SANI-BAG+® has a superior saturation point, absorbing nearly 53% more liquid than BAG X.

The CLEANWASTE SANI-BAG+® has a superior rate of absorption, absorbing liquid 6x faster than BAG X.

The CLEANWASTE SANI-BAG+® has superior closure efficacy, completely retaining its contents when inverted as opposed to BAG X.

When human waste is deposited into the CLEANWASTE SANI-BAG+® the user can be confident that the system will provide an extreme line of defense against harmful pathogens. The absorbent powder contained in the CLEANWASTE SANI-BAG+® is superior in performance to the absorbing pad contained in BAG X. Additionally, the closure system of the CLEANWASTE SANI-BAG+® provides a higher standard of protection than the pulls ties of BAG X. The CLEANWASTE SANI-BAG+® will quickly absorb and retain more human waste than the competitor's liner, allowing the patient and caregiver to be confident that he or she will be safe when handling human waste.

References

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