



Brief report

Potential bloodborne pathogen exposure from occult mattress damage

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Key Word:
Fluid

A near-miss patient incident involving body fluid seeping from a mattress led to a visual inspection of 656 hospital bed mattresses of which 177 were contaminated because of occult damage to mattress covers.

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Much time, effort, and expense in medical care facilities is devoted to disinfecting potentially contaminated surfaces as well as to preventing bloodborne pathogen exposures. Cleaning and disinfecting procedures, and myriad disinfecting products and materials are employed to help reduce the bioburden on such surfaces and maintain a clean and healthy environment, and extensive staff training/annual retraining is provided on both disinfection procedures and measures to avoid blood exposures. However, no matter how extensive these efforts are—no matter how much elbow grease is expended—the unexpected can happen.

CASE REPORT

During August 2011 an average-sized male patient (body mass index 29.5) was electively admitted to a clean room of a 781 bed tertiary care academic medical center. After resting on the bed for several hours, the patient lifted the corner of the bed pad he was lying on and noticed the back of the bed pad and mattress underneath were contaminated with a blood-like fluid. Pressure from the patient's body caused the blood-like fluid to seep from the mattress and stain the bed pad and sheets. The patient was quickly moved to another bed and patient and staff were not exposed to the fluid.

Subsequent investigation determined that the previous occupant of the bed, who had undergone a minor surgical procedure, could have bled onto the mattress. Close examination of the mattress found that although a permeable external cover was clean and intact, an internal waterproof backing below the external cover

had severely degraded and there was a large area of stained foam rubber readily visible. The stain was dark reddish in color and was located mostly at a mid-mattress region where a patient would normally lie. An initial inspection of mattress covers on several other medical surgical floors was performed by a hospital staff member and the bed manufacturer, both of whom identified that numerous other mattresses with intact external covers had inner backing materials that had deteriorated and were no longer waterproof or impervious.

METHODS

A visual inspection of all mattresses owned by the hospital was performed by a multidisciplinary team with assistance from manufacturer's representatives. Surveillance swabs were obtained for routine aerobic and anaerobic bacteria on 7 of the compromised mattresses.

RESULTS

Inspection of 656 mattresses on the adult medical/surgical floors identified 177 mattresses with occult damage to the interior waterproof backing, all of which were replaced. Damage principally involved mattresses that were estimated to have been >5 years old.

A review of housekeeping practices and biomedical engineering procedures determined that neither hospital personnel nor manufacturer's representatives had been inspecting the interior waterproof surface of the mattresses. In addition there was no systematic inventory tracking of hospital mattresses separate from hospital beds to allow for scheduled inspections and systematic replacement.

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None of the cultures obtained from the 7 mattresses grew pathogenic microorganisms.

DISCUSSION/CONCLUSIONS

A potentially serious patient/staff bloodborne pathogen exposure was narrowly avoided by the quick actions of hospital staff. Although each mattress cover was disinfected after each patient discharge, the intact appearance of the mattress cover hid extensive interior damage. Clearly, the existing bed evaluation program was inadequate and corrective actions were taken to improve the mattress inspection process, both through increased education of staff and more frequent inspections, as well as an inventory tracking system.

Beyond the issue of bloodborne pathogen exposure, previous reports have documented that mattress surfaces and mattress interiors can be contaminated with *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, and *Acinetobacter baumannii*.^{1,2} In addition, damaged and wet mattresses have been linked to hospital outbreaks with the concern noted that organisms contaminating interior foam have been extruded onto the mattress surface when patients recline on the mattresses.¹ A limitation of our investigation is that due to time constraints we were not able to perform a comprehensive assessment for microbiologic contamination of the damaged mattresses at our institution.

A prior study also found a similar high rate of unrecognized mattress damage. During a comprehensive audit performed in 1994, one UK hospital noted damage to 261 of 927 mattresses severe enough to require immediate replacement.³

In summary, we found that bloodborne pathogen exposure could potentially occur due to damage to the interior surfaces of a modern hospital mattress without visibly apparent compromise to the mattress. Hospital-grade disinfecting solutions, friction, compromised zippers, and microtears are some of the culprits that likely led to the degradation of the internal waterproof backing of multiple mattresses at our institution. Because such damage is inevitable, housekeeping personnel should be trained to recognize potential problems with mattress covers. In addition, institutions should establish programs for tagging mattresses separately from bed frames, performing routine cleaning, inspecting interior

impervious surfaces, and preventing misuse. Planned mattress replacement should follow governing body recommendations and manufacturers' warranties. Because contractual agreements with a bed and mattress manufacturer do not necessarily include mattress and mattress cover inspections, such maintenance contracts should contain specific clauses whereby the mattress and cover are inspected at least once a year, preferably every 6 months. We suggest conducting further research to address mattress integrity in hospital instructions.

A Food and Drug Administration Safety Communication was issued April 19, 2013, warning of risks related to damaged medical bed mattresses that could pose a risk of contamination and infection.⁴ The Food and Drug Administration lists several recommendations for inspection and maintenance of mattresses, including:

- Regularly check each medical bed mattress cover for any visible signs of damage or wear such as cuts, tears, cracks, pinholes, snags or stains;
- Routinely remove the medical bed mattress cover and check its inside surface. Once the mattress cover is removed, inspect the mattress for wet spots, staining, or signs of damage or wear. Check all sides and the bottom of the mattress;
- Immediately replace any medical bed mattress cover with visible signs of damage or wear to reduce the risk of infection to patients; and
- DO NOT stick needles into a medical bed mattress through the mattress cover.

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