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Human Infant Pants for Postoperative Protection during Social Housing of New Zealand White Rabbits (*Oryctolagus cuniculus*)

Kristina A Bartley* **and Crystal H Johnson**

Elizabethan collars (E-collars) are commonly used in various species to safeguard healing wounds. However, E-collars inadvertently restrict the expression of normal species-typical behaviors, including coprophagy, self-grooming, and social housing. To maintain social housing in accordance with recommendations in the 8th edition of the *Guide for the Care and Use of Laboratory Animals*, we implemented the use of human infant pants instead of E-collars for postsurgical protection. We retrospectively reviewed the medical records of 154 intact male New Zealand white rabbits (age, 2 to 3 mo) regarding the use of E-collars (group 1; *n* = 72) compared with human infant pants (group 2; *n* = 82) for postoperative protection after 308 femoral angioplasty procedures. Maintenance of social pairs throughout the postoperative phase, replacement rate of infant pants, and self-mutilation rates were measured. Our findings indicate that using infant pants for postoperative protection was most successful in maintaining social housing, offers a more cost-effective option to E-collars, and does not increase the rate of self-mutilation in intact male New Zealand white rabbits.

Abbreviation: E-collar, Elizabethan collar

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New Zealand white rabbits, one of the most commonly used rabbit lines in biomedical research, are direct descendants of the European rabbit, *Oryctolagus cuniculus*.[3,15] European rabbits are social in nature and live in large burrow systems. In contrast, Eastern cottontail rabbits (*Syvilagus floridanus*), the most common rabbit in North America, are highly territorial, solitary animals.[17] At approximately 10 wk of age, European rabbits establish dominance and form stable hierarchies.[3] Each warren typically consists of 6 to 10 adults with distinct hierarchies of an α male with submissive males and females.[3,13,14] Multiple warrens will come together to graze but return to their corresponding groups to socialize, build nests, and sleep.[3,13,14,17]Although rabbits have social behavior in the wild, socially housing rabbits in the laboratory setting can be challenging.

In group-housed male rabbits, aggression is prevalent due to their territorial behavior.[13] When establishing dominance, chasing is observed between the alpha buck and submissive animal, in which the submissive animal has the ability to retreat, signifying submissive behavior toward the α buck.[14] True submission is displayed when the submissive animal is out of the alpha buck's eyesight.[3,13,14] In the laboratory, often chasing behavior is subdued due to lack of caging space, hiding opportunities, and intervention from personnel. With the new emphasis prompted by the 8th edition of the *Guide for the Care and Use of Laboratory Animals*[9] on socially housing species thought to be social in nature, it is important to consider the natural behavior of this species.[9] Thus socially housed laboratory rabbits ideally have adequate space for chase and retreat.[13,14]

In the atherosclerosis study[5] that prompted the current investigation, factors such as age, weight, and postoperative care were all barriers to social housing success in male New Zealand white rabbits. Because these rabbits were adult uncastrated males, social housing success was minimal. Female New Zealand white rabbits were not used as a research model for the study, because estrogen is a confounding factor in the development of atherosclerosis.[5] Specifically, estrogen acts as a protectant reducing the development of plaques on the arteries; therefore, only male New Zealand white rabbits were used as a research model for the study.[5] In the IACUC-approved protocol, 2 surgical procedures were scheduled approximately 1 mo apart. Due to the type of postoperative protection used (E-collar), rabbits required separation for the duration of the postoperative recovery period. Because rabbits are territorial, the success rate of placing animals back together after the completion of postoperative treatment was low. In addition, the age and weight requirements of the animals used for the atherosclerosis research reduced the possibility of purchasing littermates.

To comply with the recommendations of the *Guide* for social housing, we collaborated with the research teams to adjust the age and weight of rabbits procured for their studies to support the purchase of littermates that were maintained in social pairs during the postoperative recovery period. We used E-collars as postsurgical protection. However, with the use of E-collars for protection of the surgical incision site, the rabbits were able to remove the collars with help from their cagemates, leading to self-mutilation of the incision sites and therefore requiring replacement of the E-collar, separation from the cagemate, and veterinary intervention for treatment of injuries. In light of these complications, developing a successful social housing program for male intact New Zealand white rabbits required the development of novel techniques.

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Icahn School Medicine at Mount Sinai Center for Comparative Medicine and Surgery, New York, New York
**Corresponding author. Email: Kristina.carter@mssm.edu*

Human infant pants have been used as a form of bandaging to decrease self-mutilation postoperatively.[18] That study evaluated treatments of no interference, bandaging, or using infant pants and found that using infant pants as a form of postoperative protection promoted wound healing because the cotton allowed for the tissue to breathe.[18] We applied this novel way of postoperative care to our socially housed rabbits. We wanted to determine whether using infant pants as postoperative protection increased social housing success in male intact New Zealand white rabbits. In this retrospective review of medical records of New Zealand white rabbits used for atherosclerosis research, we examined 2 postsurgical protection options to maintain social housing of adult intact male New Zealand white rabbits: traditional E-collars and human infant pants. We hypothesized that human infant pants used as a refinement for postoperative protection in comparison to the use of E-collars would allow preservation of pair housing for male intact New Zealand white rabbits.

Materials and Methods

Animals. We reviewed the postoperative medical records of 154 intact male New Zealand white rabbits (age, 2 to 3 mo; average weight, 3 kg) for this study. Rabbits were purchased as littermates from a commercial source (Charles River Laboratories, Oakwood, MI) and pair-housed upon arrival. Because the vendor did not support social housing of rabbits larger than 3 kg, we collaboratively worked with the vendor and research community to facilitate the purchase of littermates weighing 2.5 to 3.0 kg. Vendor surveillance reports were negative for rabbit hemorrhagic disease virus, myxomatosis, rotavirus, *Bordetella bronchiseptica*, cilia-associated respiratory bacillus, *Clostridium piliforme*, *Corynebacterium kutscheri*, dermatophytes, *Helicobacter bilis*, *Helicobacter hepaticus*, other *Helicobacter* spp., *Klebsiella oxytoca*, *Pasteurella multocida*, *Pseudomonas aeruginosa*, *Salmonella* spp., *Streptococcus pneumoniae*, *Streptococcus* spp., *Toxoplasma* spp., *Treponema cuniculi*, ectoparasites, endoparasites, enteric protozoa, and *Encephalitozoon cuniculi*. The rabbits were divided into 2 groups according to the retrospective postoperative protection method used: group 1 included 72 animals that were provided E-collars for postoperative protection and subsequently separated postoperatively, and group 2 included 82 animals that were clothed in infant pants for postoperative protection but remained pair-housed throughout the postoperative recovery period.

Housing. The rabbits were housed and cared for in compliance with the *Guide for the Care and Use of Laboratory Animals*, 8th edition,[9] in an AAALAC-accredited facility. All procedures involving animal care and use were approved by the IACUC at the Icahn School of Medicine at Mount Sinai. Rabbits were housed with their littermate in commercially available social housing units (Euro Rabbit Rack, Allentown Caging, Allentown, NJ) measuring 73.0 × 53.3 × 25.4 cm for each cage (Figure 1). The cages were equipped with polycarbonate perching and shelter structures and acrylic perforated separation panels. Rabbits were provided access to 2 cage units when pair-housed and one cage unit when singly housed. Rabbit units were sanitized once every 2 wk. Techboard (24 in. × 30 in., Shepherd Specialty Papers, Watertown, TN) was used in the cage pans for the collection of urine and feces. Relative humidity and temperature in the animal room were maintained at 30% to 70% and 68 to 72 °F (18 to 29 °C), respectively, under a 12:12-h light:dark cycle. Reverse-osmosis–treated water was provided without restriction through an automatic delivery system. Animals were placed on a high-fiber rabbit diet (Lab Diet 5326, Purina Mills International, St Louis, MO) on arrival to our facility and were maintained on this chow for as long as 2 wk prior to initiation of study aims; they subsequently were switched to a diet containing 0.1% to 0.3% cholesterol (Certified Rabbit Chow 5322, Purina) for the duration (6 to 9 mo) of the study.

Figure 1. (A) Commercially available social housing unit (Euro Rabbit Rack, Allentown Caging) measuring 73.0 × 53.3 × 25.4 cm for each cage. (B) Cages were equipped with perching and shelter structures. Rabbits were provided access to 2 cage units when pair-housed and one cage unit when singly housed. The photo shows 2 male New Zealand white rabbits from group 2 at 6 mo after their second surgeries.

Behavior management and enrichment program. The Behavior Management and Psychologic Enrichment Program is responsible for the promotion of psychologic wellbeing as evident by the display of species-typical behavior through environmental enrichment, species appropriate food enrichment manipulanda and implementation of positive reinforcement training. Through this program, each rabbit was provided manipulanda on the door and floor of the cage that was changed weekly and daily edible enrichment.

E-collars and human infant pants. E-collars purchased from a commercial source (Patterson Veterinary Supply, Devens, MA), were made of low-density polyethylene, measured 28 to 38 cm in diameter, and had a 3-snap adjustable closure. The neck of the E-collar was padded with soft vinyl foam (Figure 2). Appropriate fit of the E-collar provided space for 2 fingers of a caretaker, equivalent to approximately 2 cm in width. E-collars were placed on the rabbits immediately after surgery while they were still recovering from anesthesia.

Figure 2. E-collar (diameter, 28 to 38 cm; Patterson Veterinary Supply) with 3-snap adjustment. The E-collar is padded with soft vinyl foam around the neck opening.

Human infant pants were purchased locally (size, 0 to 3 mo; Cat and Jack, Target, Minneapolis, MN) and online (size, newborn; Simple Joys, Carter, Atlanta, GA) and were 100% cotton with full elastic waistband (Figure 3). The infant pants used were designed to fit humans weighing 5 to 7 kg and measuring 60 to 63 cm in length.[18] Pants were placed on the rabbits immediately after surgery, during recovery from anesthesia.

A 5- to 7-cm slit was cut in the infant pants to accommodate genitalia and tail exposure, allowing the animal to urinate and defecate inside the cage. Once the infant pants were on the rabbits, the top of the pants was folded approximately 1.5 cm, to shorten the length of the pants to stop directly above the hock (Figure 3).[18] Elastic bandage wrap was used to secure the pants around the abdomen and hock, to prevent dislodging of the pants.[18] A minimum of 1 cm of space was used as a guide to ensure that the elastic bandage applied to the pants did not create constriction or discomfort to the rabbit (Figure 3). The veterinary staff monitored all rabbits daily by for mobility and discomfort while they wore the pants. In addition, because the infant pants were a novel method, the husbandry staff was trained to observe for abnormalities including but not limited to swollen feet, lack of activity, and absence of urine or feces in the cages. Both the E-collar and infant pants were worn by the rabbits for the duration of the 10-d postoperative recovery period. The infant pants were not removed during the postoperative phase for examination of the incision site, unless abnormal clinical signs were present. Surgical incision sites were examined after pants or E-collars were removed by the veterinary staff.

Research history. In short, 2 balloon angioplastic procedures using a cut-down approach on the ventral cranial aspect of each hindlimb to access the femoral artery were performed on each animal approximately 1 mo apart. The endothelium of the abdominal and thoracic aorta was denuded through a cutdown approach. Ketamine (20 to 60 mg/kg IM) and xylazine (3 to 9 mg/kg IM) were used for general anesthesia, with all animals receiving appropriate analgesia (buprenorphine, 0.3 mg/kg IM) twice daily for 3 d postoperatively, with additional doses provided as necessary.

Study groups. In total, the 154 pair-housed rabbits underwent 308 angioplasty procedures. Animals were weighed prior to each surgery. After each angioplasty, either pants or an E-collar was placed on the rabbit for postoperative protection according to the method prescribed by the veterinarian at the time of surgery. After review of the medical records, rabbits were categorized into 2 groups according to the postoperative protection method used. Group 1 included 72 rabbits that were provided E-collars for postoperative protection. After surgery, these rabbits were separated from their cagemates for 10 d. The E-collars were removed on postoperative day 11, and each rabbit was reintroduced to its cagemate in a clean, neutral (lacking scent marking) cage. Rabbits were observed for compatibility 5 to 20 min. If rabbits were observed displaying aggressive behaviors continuously over the course of 5 to 20 min, they were separated and singly housed. A housing cage-card was placed on the cage noting 'social incompatibility' for the justification of single housing.

Group 2 included 82 rabbits that were provided with human infant pants as postsurgical protection. Rabbits in group 2 were socially housed immediately after recovery from anesthesia. Infant pants were removed on postoperative day 11. If pants were removed or destroyed by the rabbit during the postoperative period, a new pair of pants or an E-collar was implemented as determined by the facility veterinarian, but social housing was maintained. Both methods of postoperative protection were observed for successful incision wound healing, to ensure that the incision was closed on suture removal. Self-mutilation was determined to have occurred if an animal injured itself, requiring veterinary medical intervention, by chewing digits, incision sites, or any other area in proximity to the surgical site.

Social housing parameters. Behaviors noted during a 5 to 20 min observation period were used to determine social housing failure or success. During that time, rabbits were observed for moderate to severe aggression and positive affiliative behaviors. Severe aggression was characterized as a dominant animal chasing and biting the nose, eyes, or genital area of a subordinate, at which the animals were separated immediately and evaluated by the facility veterinarian for injuries. Moderate aggression was categorized as both animals attempting to bite each other in vertical positions, with no clear hierarchy established. These animals would be observed for 10 min to see whether the animals developed a hierarchy. If not, and if continued aggression was observed, animals were separated and housed singly for the duration of the study. Mild aggression was described as dominant animal chasing submissive animal and plucking submissive animal's hair. Animals remained paired when this behavior was observed. Positive affiliative behaviors on introduction were noted when the dominant male chased, groomed, or mounted the submissive animal; other affiliative behaviors were eating together and resting in contact with each other. Observing affiliative behaviors with a clear dominant–submissive relationship between cagemates was considered to indicate a successful pair. These animals remained paired throughout the study.

Statistical analysis. Statistical analysis was performed by using commercially available computer software (GraphPad Software, San Diego, CA). Fisher exact tests were used to compare social housing success for both groups as well as to compare the rate of failure of infant pants for both surgeries. The self-mutilation rate was compared between groups 1 and 2 by using the χ^2 test. Significance was set at a P value of less than 0.05.

Results

Social housing. Data presented for social housing success was quantified as successful reintroduction postoperatively for group 1 and as animals that remained socially housed postoperatively for Group 2. Animals that exhibited agonistic

Figure 3. (A) Human infant pants (Simply Joy, Carter) in size 0–3 mo (left) and newborn (right) with full elastic waist band. (B) Left lateral and caudal view of human infant pants on postoperative day 0. (C) Rabbits in cage on postoperative day 2, with pants intact and no issues with mobility. (D) Right lateral and caudal view of infant pants on postoperative day 10, noting multiple tears and soiling. There were no complications observed with healing of the incision site.

behaviors resulting in injurious aggression were separated and noted as failed paired-housing attempts. Overall, the parameters measured were the number of successful socially housed pairs after the postoperative recovery phase, the failure rate of human infant pants, and the self-mutilation rate.

Social housing success was greater in group 2 for both surgical procedures: group 1, 5% after the first surgery, with no successful pairs after the second surgery ($P < 0.05$); and group 2, 82% after the first surgery, and 97% for the second surgery ($P < 0.05$; Figure 4). Social housing success increased by 15% from

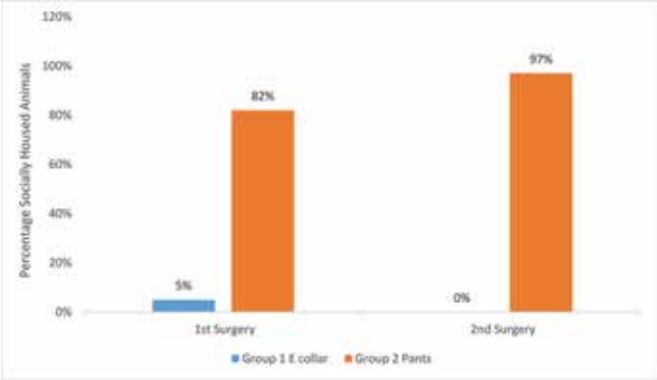

Figure 4. In group 1 (n = 72), rabbits wearing E-collars were separated from cagemates after surgery and reintroduced 11 d postoperatively. In Group 2 (n = 82), rabbits wearing human infant pants were paired housed immediately after surgery. The percentage of social housing success was calculated according to the number of successful pairs on day 11 after each surgical procedure. Social housing percentages differ significantly ($P < 0.05$) between groups, with greater success for group 2 animals, which wore human infant pants.

the first surgery to the second surgery in group 2, whereas it decreased by 5% in group 1.

Rate of failure of infant pants. Replacement of dislodged human infant pants was defined as failure of infant pants. Pants were replaced with either a new pair of infant pants or an E-collar according to the veterinarian's discretion over a 10-d period for both surgeries in groups 1 and 2 (Figure 5). The rate of failure of infant pants differed significantly ($P < 0.05$) between the first (62%) and second surgery (37%), with a 25% decrease noted between the rate of failure from the first surgery to the second surgery ($P = 0.046$). Although infant pants were replaced with either an E-collar or infant pants, social housing was maintained for the duration of the study. Because this study was a retrospective review, failure of the E-collar was not noted in the medical record and therefore not measured.

Self-mutilation rate. Associated self-mutilation was minimal for both group 1(4 of 144 animals) and group 2 procedures (0 of 164 animals; $P > 0.05$).

Wound healing. There was no difference noted in the healing of the incision site between the 2 postoperative protective methods used. Incision sites for both E-collars and infant pants were completely healed by the time either form of postoperative protection was removed. There was no difference in weight between groups 1 and 2. Because body weight was measured only prior to surgery and if the animal presented for anorexia or a decrease in body condition score, correlation between the postoperative method and weight loss was not assessed.

Discussion

In this study, social housing success was significantly greater in group 2 (rabbits wearing infant pants) than group 1 (rabbits wearing E-collars). Using human infant pants as postoperative protection and to keep rabbits socially housed postoperatively was shown to decrease aggression, maintain social hierarchy, and stabilize the pairing. Compared with group 2, group 1 had significantly lower social housing success as these rabbits were separated postoperatively for 10 d due to the type of postoperative protection used (E-collars). When reintroduced at 11 d after surgery, the need to reestablish social hierarchy resulted in increased behaviors including severe biting of the nose, eyes, and genital areas from both cagemates. Consequently, these animals were singly housed due to social incompatibility for the duration of the study.

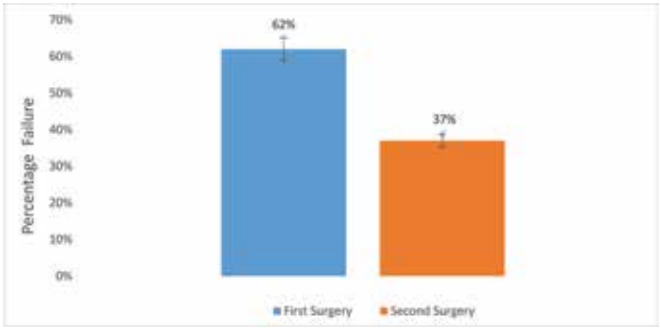

Figure 5. Infant pants failure in group 2 (n = 82) was defined as replacement of pants with either another pair of infant pants or an E-collar during the 10-d postoperative recovery phase. The percentage of failure differed significantly ($P < 0.05$) between the first and second surgeries.

The rate of failure of the infant pants in group 2 decreased by 15% between the first surgery and second surgery. The learning curve from the first to the second surgery regarding appropriate installation of the pants, in addition to the animals' comfort while wearing and acclimation to the infant pants, were possible contributing factors to this decrease. During the first surgery cohort, when applying the elastic bandage to secure the pants, the veterinary team took extreme precaution in ensuring the pants did not create constriction around the abdomen or hocks. Consequently, the first cohort of pants applied may have been too loose, enabling pants to dislodge and thus increasing the rate of replacement to an extent not observed during the second cohort of postoperative pants protection.

In group 2, 85% of social pairs were maintained for at least 3 mo (approximately 4.5 mo after initial arrival to the facility) after their second surgery, decreasing to 68% at 6 mo (approximately 7.5 mo after initial arrival to the facility) after the second surgery. The decrease in social housing was due to multiple variables, including but not limited to end-of-study time points, euthanasia endpoints, and social incompatibility. Although not all group 2 pairs were successfully maintained, more than 50% of the pairs were maintained for the duration of the study.

Self-mutilation was minimal for both groups. Research has shown increased self-mutilation and stereotypies in singly housed animals, due to boredom, lack of appropriate caging, stress, and surgical complications.[2,8,12] Rabbits usually exhibit self-mutilation in regard to their fur, mammary glands, or digits.[2,8] Therefore it was imperative to examine whether self-mutilation was a factor in social housing. Of the 308 total surgeries for groups 1 and 2 combined, approximately only 1% of procedures (4 of 308) resulted in self-mutilation. These findings might be attributed to peripheral neuropathy, a possible sequel to angioplastic procedures. Furthermore, the 4 animals that self-mutilated were all in the E-collar group (group 1) and therefore were singly housed postoperatively. However, it is unclear whether this self-mutilation was due to single housing or nerve damage or both. Nonetheless, our data show no cases of self-injurious behavior while using the infant pants as postoperative protection.

E-collars constructed of low-density polyethylene have been known to prevent self-injurious behavior after surgical procedures. With the ability to adjust the circumference to comfortably fit the animal's neck, E-collars aid in the wound healing process by preventing interference with surgical incisions, wounds, or catheters and thus minimizing opportunistic infections.[1,2,18] Although E-collars are highly effective and advantageous for surgical protection, their use also has dis-

advantages. The rigidity of the collar can make it extremely difficult for the animal to access food and water, which can lead to postoperative anorexia and potentially both liver damage and gastrointestinal stasis.[2,4,6] Removal of the E-collar when the animal needs feed or water has been suggested to avoid postoperative anorexia, but in the biomedical research laboratory setting, this practice could be labor-intensive and might provide an opportunity for the animal to explore the healing wound.[2,6] Specifically, in species that practice coprophagy, such as rabbits, wearing an E-collar also contributes to a deficiency in the dietary consumption of feces.[2] Coprophagy is essential for rabbits, because the soft feces contain high levels of vitamins K and B and twice the protein of regular feces.[6] Failure of rabbits to express coprophagy inhibits the essential nutrients necessary to maintain a healthy digestive system.[6] Moreover, due to the lack of grooming due to wearing an E-collar, rabbits develop fur matting and perianal staining.[2] Conversely, human infant pants used as postsurgical protection allowed animals to freely access food and water and to exhibit natural behaviors such as coprophagy and self-grooming. Therefore, no group 2 animals presented with postoperative anorexia, nutrient deficiency, depression, or matted fur.

When comparing E-collars and human infant pants, another consideration is cost: E-collars were purchased at US $12 to 15 each, whereas human infant pants cost US $12 to 15 for a pack of 4 pair of pants. Although human infant pants occasionally had to be replaced by either an E-collar or more infant pants, infant pants were still the more cost-effective option. In addition, the cost of infant pants could be decreased through donations from inhouse personnel or local organizations. Depending on their condition (severity of tears, stains, size) once they were removed from the animals, the infant pants were discarded or processed through the tunnel washer for reuse in the next set of surgeries. Therefore, human infant pants were found to be a more cost-effective option for postoperative protection than E-collars. However, depending on the number of rabbits and surgical procedures involved, the cost difference between infant pants and E-collars should be investigated further.

Studies have demonstrated that socially housing rabbits as littermates improves social housing success if they are never separated.[3,10] Housing rabbits that are unacquainted increases agonistic interactions that result in separation and social housing failure.[10] By adjusting the weight requirement of the animals that we purchased from 3.5 kg to 2.5 to 3.0 kg, we were able to obtain littermates to support research aims. The rabbits were placed on a high-cholesterol diet for 2 wk prior to the initial surgery, and this interval allowed animals to reach the weight desired by the research staff. In conjunction with the use of infant pants for postsurgical protection, we believe that securing littermates added to the social housing success for group 2. Historically, several attempts were made to socially house rabbits with E-collars postoperatively; however, cagemates assisted with the removal of the E-collar through dislodgment or complete gnawing of the E-collar leading to access of the incision site and periodic self-mutilation. In addition, the size and shape of the E-collar created challenges for social housing rabbits in group 1. The size of the E-collar prevented the rabbit's ability to fit under the built-in shelters of the Allentown Euro Social Housing units. Therefore, it was impossible for group 1 rabbits to successfully exhibit chase and retreat behavior to establish social hierarchy. In contrast, animals wearing infant pants did not experience this obstruction, and thus the social hierarchy was maintained through appropriate use of the built-in shelters allowing species-typical behavior. Although infant pants allowed rabbits to exhibit natural behaviors, we cannot rule out that if animals were separated postoperatively, that similar social housing results as in the E-collar group would occur. More studies are needed to support this concept.

One group has shown that maintaining social housing postoperatively increases rate of wound healing, reduces stress, as well as provides companionship while healing from surgery.[16] In that study, 28 adult female mice were individually housed, socially housed, or separated by using a grid partition after telemetry implantation.[16] Several parameters were measured including body temperature, heart rate, behavior, nest building and ease of handling.[16] The authors concluded that animals housed together postoperatively were less affected by surgery than the other animals. The cohoused mice showed fewer pain behaviors, less grooming and resting, and more climbing. Furthermore, heart rates of socially housed mice were lower throughout the entire study compared with individually housed animals, which exhibited higher heart rates and various differences in behavior.[16] Another study reviewed the effect of enrichment and social housing on pre- and postoperative rats, in which a slower recovery to homeostasis was due to the lack of an appropriate environment; consequently, a change in social housing status, can, in fact, delay the surgical healing process.[11] Although the cited studies do not involve rabbits, they nonetheless provide clear evidence that social housing postoperatively should strongly be considered and positively influences wound healing, stress, and recovery. Through this retrospective study, we examined the use of 2 forms of postoperative protection, but only the infant pants allowed us to keep the rabbits socially housed for the duration of the study, enabled natural behaviors such as self-grooming and coprophagy, and sufficiently protected the surgical incision site.

The primary objective of this study was to compare methods of postoperative protection to increase social housing success in male intact New Zealand white rabbits. We hypothesized that using human infant pants while keeping rabbits together postoperatively would increase social housing success. Our results support our hypothesis and show that using this method significantly increases social housing success in adult male uncastrated New Zealand white rabbits. Although additional modifications are needed to reduce the rate of failure for infant pants, we are confident that human infant pants are a comparable alternative for postoperative protection. We suggest that consideration should be given to using human infant pants as an alternative form of postoperative protection to maintain or increase social housing success in New Zealand white male rabbits.

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