ICU patients are at risk for infection during hospitalization. Hospital acquired infections are preventable in these patients through intelligent nursing care and infection prevention and control plans. It is imperative that ICU nursing staff be proactive in disease prevention, knowledge, and protocol implementation. Establishing an infection control plan that not only prevents hospital acquired infections but also disease transmission will improve ICU patient outcome as well as hospital staff safety.

Disease prevention in the hospital is a constant battle, and strict adherence to an infection control plan is crucial. The ICU houses immune suppressed patients at risk for infection, but is also a great source for bacterial growth. Critical care patients are vulnerable to nosocomial infections due to their compromised immune state. Hospital staff is susceptible to zoonotic disease and bacterial transmission. Reverse barrier nursing, infection control plans, staff safety, establishing an Infection Control Committee, and tips for risk reduction in the hospital will be addressed below.

Reverse barrier nursing should be commonplace in the ICU. To decrease the spread of pathogens from humans to animals (and vice versa), while preventing disease transmission between patients, hand hygiene is imperative. Hands must be washed between patients, antimicrobial soaps or alcohol-based hand sanitizers used, and gloves worn during patient handling and treatments. Hand sanitation stations placed strategically throughout the hospital can promote proper hand hygiene. It is also recommended patients not be moved from cage to cage in order to avoid exposure to additional viruses and bacteria. Patient cleanliness is also important to prevent additional infection. Pressure sores and urine scald are potential sources of infection in recumbent ICU patients. Animals on a ventilator, or those who are comatose (induced vs. pathologic) require a higher level of disease prevention through nursing care. Establishing a single nurse to care for these patients not only facilitates better patient care, but also prevents the introduction of new pathogens.

Infection control plans should be established for various contagious and zoonotic diseases in the hospital. A sample plan:

Presentation/Admit:
Patients suspected of having a contagious disease should ideally be taken directly to an exam room. The patient should stay in that room until further diagnostics are required or brought straight back to the Isolation ward. If a known infectious patient is coming in, hold an exam room for the patient, and bring them through a separate entrance if possible. From that point the patient should be moved to either isolation or other designated areas in the hospital. Disinfect the room once the patient is moved. If possible, a designated technician should triage any suspected infectious patients to better minimize any exposure, and continue to be their nurse for any further treatments. If it is necessary to handle other patients, as long as proper barrier nursing has been applied, you are not limited to what patients you can touch (at the discretion of the attending doctor). Always use reverse barrier nursing (and caution) with any unvaccinated/ immunosuppressed patients. In any case, proper barrier technique should be used. Gloves and an isolation gown should be worn whenever handling any patient suspected of being infectious. When done handling the patient, remove gown and gloves then wash hands well.

Setting up isolation ward:
Keep in mind only the bare minimum is kept in the isolation ward. It is advised not to take medical records into the isolation are as well, as these can be potential sources for infection transmission. Do not stock medical supplies, bedding, or drugs in the isolation ward. It is recommended to only take what medical supplies you will need at that moment. Any left over medical supplies will have to be discarded when the patient is discharged. The only things kept in the isolation ward are things that can be disinfected after every patient. Here is a sample list of what is may be stocked:

-Doppler
-Pulse ox
-IV pumps
- Nebulization unit
- Syringe pump
- Pair of clippers
- Baby scale
- Circulating water blanket

It may also be beneficial to have disease specific isolation bins, labeled, with items that may be disinfected between patients. For example:

- Pen
- (Small) Alcohol Bottle
- (Small) Hydrogen peroxide Bottle
- Stethoscope
- Thermometer
- Bottle doppler gel
- An assortment of blood pressure cuffs and sphygmomanometer
- 4 Booties (to walk potentially infectious dermatology patients through the hospital)

It is also necessary to have a foot bath, gowns, and gloves available near the isolation area. All gowns should be replaced if they become ripped or soiled. Gloves should be discarded after handling the patient. It is also beneficial to have hand sanitizing stations near the isolation ward to encourage proper hand hygiene. In order to keep all infectious bedding separate for processing, an isolation laundry bin may be used. In addition to his precaution, a separate isolation washer and dryer for laundry processing can aid in infection prevention. It is advised to wash all bedding in bleach. A separate isolation bin for trash and waste will prevent further spread of infection in the hospital. If a patient receives chemotherapy, it is important to place all waste and medical supplies from that patient in a chemotherapy bag for trash disposal. This alerts anyone who may come into contact with the trash that there is a potential they may come into contact with chemo agents. Though this risk is low, it is advised to keep staff and sanitation workers safe. When changing isolation or chemotherapy trash, it must be taken directly to the dumpster.

Isolation ward disinfection:
Remove all trash and bedding from the isolation room. Any equipment that does not permanently stay in isolation can now be sprayed down with disinfectant, then wiped down and put away.
Wipe down all surfaces to remove any organic/biological material. Then spray disinfectant on floor, cages, and any other surfaces in the isolation ward. The disinfectant the author uses is ACCEL®. The dilution factor is 480ml ACCEL® in 2 Gal of H2O. Product must sit for 5 minutes before being wiped off to be effective. It can also be used in a foot bath in the isolation area. It is an accelerated hydrogen peroxide solution that is safe for animals and people. It is considered environmentally "green", safe, and effective. It has anti-bacterial, anti-fungal, and anti-viral properties. It can be used for Parvovirus, MRSA/MRSP infections, Bordetella, Calici & Herpes virus, Ringworm, Salmonella, E-coli, Enterococcus, Pseudomonas, and common food-borne illnesses, as well as Leptospirosis (FDA pending).

For disease specific infection control protocols, a sample outline is supplied below:

Parvovirus:
Parvovirus patients ideally should be kept in the Isolation ward. However if the doctor deems the patient to be critical, it may be placed in the general treatment area in a low traffic area. It is advised to keep any immunosuppressed or unvaccinated young animals away from this area. Set up a foot bath and place a sign indicating parvovirus. A gown and gloves must be worn at all times when handling the patient. Use the parvovirus isolation bin for patient treatments. Any supplies used for this patient that cannot be sanitized must be discarded. These patients should not be walked outside.

Leptospirosis:
Leptospirosis patients ideally should be kept in the Isolation ward. However if the doctor deems the patient to be critical, it may be placed in the general treatment area in a low traffic area. It is advised to keep any immunosuppressed or unvaccinated young animals away from this area. A bottom cage is ideal in the event the patient urinates, it will not contaminate the lower cages. Some of these patients require a urinary catheter to monitor urine output. This is ideal, as it keep potentially infectious urine contained.
Leptospirosis patients should be treated with the isolation protocol above, until they have been on antibiotics longer than 24 hours (according to some infection control protocols). Set up a foot bath and sign indicating the pet is a Leptospirosis suspect. A gown, gloves, and protective eyewear must be worn at all times when handling the patient. Use the Leptospirosis isolation bin for patient treatments. Any supplies used for this patient that cannot be sanitized must be discarded. These patients should not be walked outside.

Skin Infections (including MRSP/MRSA):
All suspected skin infection patients ideally should be kept in the Isolation ward. However if the doctor deems the patient to be critical, it may be placed in the general treatment area in a low traffic area. Set up a foot bath and place a sign indicating the pet is a skin infection suspect (i.e. MRSA/MRSP). A gown, booties, and gloves must be worn at all times when handling the patient. Discard gown, gloves, and booties after handling skin infection/wound management patient. When walking a skin infection patient through the hospital, booties should be on the patients’ feet to prevent the spread of infection. Booties should be kept in the appropriate isolation bin. Use the skin infection bin for patient treatments. Any supplies that cannot be sanitized need to be thrown away.

Wounds:
All wound patients should be treated with the same isolation protocol as skin infection patients. Not only to prevent spread of bacterial infections, but also to prevent the patient from contraction any further infections. It may be advisable to wear a surgical mask and cap when dealing with wound patients as well. Be sure to culture all wounds when they present, and record results for infection monitoring. Clean and cover wounds immediately upon presentation to prevent further infection. A designated area should be set aside for wound care. This area should not be used for surgical procedures, and should be considered a “dirty” table. After each use, you must wash and disinfect this area.

Upper Respiratory Infection
All upper respiratory infection patients ideally should be kept in the Isolation ward. However if the doctor deems the patient to be critical, it may be placed in the general treatment area in a low traffic area. It would be ideal to keep the patient in an oxygen chamber or isolette. Set up a foot bath and place a sign indicating the pet is an upper respiratory infection patient. A gown, and gloves must be worn at all times when handling the patient. Contrary to popular belief, aerosol transmission is not a significant means of spreading URI. URI is much more readily spread via fomites and droplet transmission (over distances of 5 feet or less). These patients should not be moved through the hospital, to prevent spreading of infection. Use the upper respiratory bin for patient treatments. Any supplies that cannot be sanitized need to be thrown away. Suspected airway fungal infection patients require the same isolation protocol as URI patients. However, a mask may or may not be necessary depending on the severity of the case especially if it is zoonotic (i.e. Aspergillosis, Blastomycosis, Histoplasmosis).

Establishing an infection control committee to institute and promote an infection control plan can decrease hospital acquired infections, while maintaining staff safety. The infection control committee can consist of a few doctors, technicians and assistants. While the doctors oversee infection control practices, technicians can educate staff and implement protocols. The assistants who are generally responsible for hospital cleanliness can be sure practices are safely accomplished. The infection control committee is responsible for reporting and documenting infection, while performing routine hospital screenings. Routine screening and surveillance of hospital surfaces, equipment, and potentially employees may be beneficial in eliminating potential sources of contamination. It is of the utmost importance that the infection control committee stay up to date on evidence-based infection control practices, updates, and current literature.

There are many ways to prevent infection in the ICU. Some techniques that can help decrease the spread of pathogens include brightly colored cage cards that can alert staff of proper patient handling, if they need to be walked in a separate area from other patients, how bedding should be processed, and proper waste disposal. These cards can also identify patients who are deemed infectious or potentially infectious. Some patients require staff wear gown, glove, mask, and booties to not only protect staff from
zoonotic disease, but also will protect other patients from transmitted disease in the hospital. Walking potentially infectious patients is not recommended. An isolation ward is recommended with proper ventilation and a separate stock of medical supplies. It is ideal to have a container of medical supplies labeled for each contagious disease, thus avoiding cross contamination. Contagious and immune suppressed patients should each have their own bag of saline flush and sterile water (for medication reconstitution). Re-wrapping IV catheters daily with routine IVC flushing to monitor for infection, patency, and phlebitis, can also aid in eliminating potential sources of infection. If urinary catheters are in place, it may be beneficial to aseptically clean the line with chlorhexadine and saline, wiping away from the prepuce. Also alcohol swabbing of all IV line connections and injection ports is good practice to decrease incidence of nosocomial infection while in the hospital.

Recumbent patients that may be at risk for urine scald or “diaper rash” may benefit clipping the soiled hair away. Allowing air to circulate and prevent urine scald can also prevent infection. Diaper rash cream can also be useful in patients with diarrhea, or leaking diarrhea. The ointment can help protect the skin from stool accumulation and the rash associated with it. (Be aware of the potential for zinc toxicity in some creams). In addition to patient cleanliness in infection prevention, addressing nutritional needs is necessary. Meeting caloric requirements in the ICU patient is a necessity for the metabolic processes that occur in critical patients, as well as maintaining gut health. Feedings via NG tube, NE tube, PEG tube feedings, IV nutrition (such as TPN), and establishing caloric needs until animals are willing to eat on their own is crucial in the ICU patient. The goal is to have the animal eating willingly, to maintain gut health.

Diet plays a role in ICU infection control as well. New studies regarding RAW diets and the patients that are fed them may be important in infection control practices. There is some concern that patients fed RAW diets may shed pathogens and multi-drug resistant bacteria. This is of concern if those patients are hospitalized in the ICU, as they may be potential sources of infection for critically ill and immune compromised patients. It may be of benefit to implement barrier nursing in RAW fed patients to prevent disease transmission.

Hospital cleanliness is necessary to eliminate sources of infection in the ICU. Proper barrier nursing, reverse barrier nursing, infection control plans, and knowledgable staff can aid in the containment and prevention of further infection in the hospital. Having a set of guidelines to follow, as well as a progressive infection control committee allows for ICU patients to remain protected while convalescing.