What Happened?

Selective Internal Radiation Therapy with Yttrium 90 Sir-Spheres is a treatment performed on patients who have inoperable liver cancer. Y-90 Sir-Spheres are microscopic resin beads that contain the radioactive isotope Yttrium-90 (Y-90) and emit radiation to kill cancer cells. These spheres are injected through an intricate system.

In this procedure, the patient has a catheter placed in the artery by their groin, and the catheter is positioned in the hepatic artery and the liver segment where the tumor is present. An additional microcatheter is then placed inside the catheter to ensure the outside catheter is not contaminated with Y-90. When the patient is ready for injection, a physician agitates the Y-90 spheres in the vial; then another physician slowly injects the spheres. A waiting period occurs after to let the spheres settle, typically about three minutes. It takes approximately 45 minutes for the spheres to be infused.

In this case, the patient was prepped, and the catheter and microcatheter were inserted. The Sir-Spheres and infusion were started, but the infusion would not enter the liver or the artery. After repeated attempts, the physician decided to stop, return the dose to Nuclear Pharmacy, and reattempt the infusion. The infusion was set into the vial improperly; and when the microcatheter was removed, there was Y-90 contamination to the physician, table, patient, bedding, cart and infusion box.

The contaminated physicians’ Personal Protective Equipment (PPE), bedding, infusion box, and cart were removed. The table was decontaminated. Y-90’s half-life is 2.67 days; therefore, all the contaminated articles were stored for 30 days. A new dose was prepared in the pharmacy, and the patient was treated successfully.

Why Did This Happen?

- The instructions for Y-90 set up were not read aloud and followed by the physicians.
- The microcatheter was removed without sufficient absorbent materials.
- The physician removing the microcatheter should not touch any other materials until cleared by the Health Physicist.

Lessons Learned

- Y-90 setup instructions must be read out loud and followed by the physicians.
- Before the infusion starts, there should be a timeout, and the physician should check the connections.
- There must be sufficient absorbent materials when the microcatheter is removed in this setting.
- Once the microcatheter is removed, the fellow should take over until the physician is cleared by the Health Physicist.
- For more information, please consult the following resources available on the EHS website:
  - Radiation Safety Tools and Resources
  - Radiation Safety Manual
  - Radiation Safety FAQ
  - Core Clinical Safety Training Programs