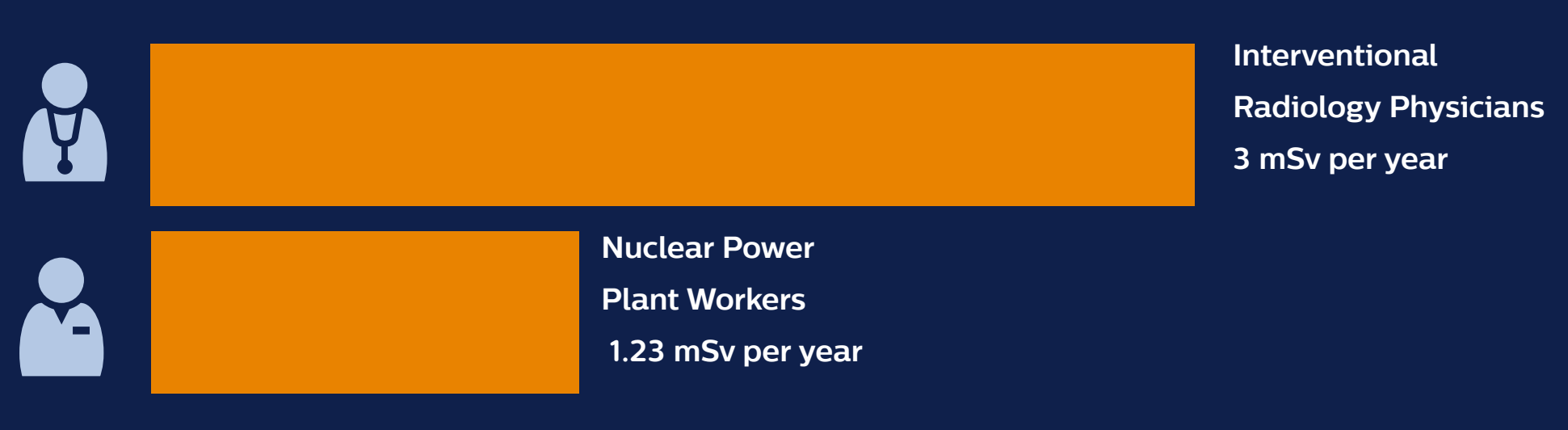
Radiation hazards
in the interventional suite

Radiation exposure is necessary for life-saving procedures, but with it comes some risk. Patients and physicians are both exposed to high levels of radiation during fluoroscopic procedures. **Physicians are exposed to scatter radiation and patients are exposed directly from the X-ray machine.**



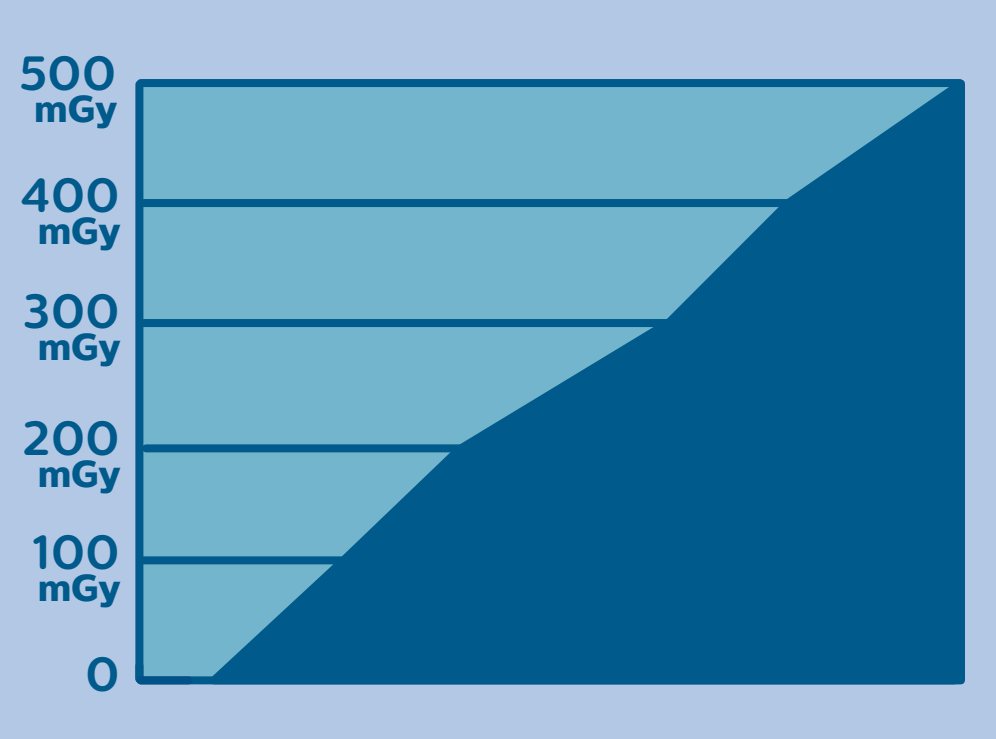
Physicians receive more radiation dose than nuclear power plant workers per year on average[1,2].

Physicians must stand very close to the patient and the source of the radiation.

Physicians receive on average 0.5 mGy per interventional procedure.

The effects of radiation to the eye lens are permanent, so the damage is cumulative. **Recent scientific guidance suggests that threshold doses for radiation-induced cataracts is 500 mGy, even if spread out over time.**

200 procedures per year **x 0.5**mGy per procedure **= 100**mGy per year



This means that physicians can reach the 500 mGy limit in 5 years!

Physicians face a real, permanent eye lens cataract health hazard in only 5 years of working.

On average patients receive about **1,400 mGy** per procedure. An average chest x-ray is **0.02 mGy.**

Fluoroscopy uses high levels of radiation so surgeons can see small items within the body, such as catheters. *This exposure is highly localized (the size of a postcard).*

The radiation dose is greatest to the skin, the entry point into the body. We can better measure this by using a value called *"Peak Skin Dose."*

There is a risk of radiation burns to the skin from fluoroscopy at levels of **2000 mGy** or higher. This can happen due to difficult or complex cases. **Although you can burn the skin it is usually a life-saving procedure, so the benefit outweighs the risk of skin injury.**

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21

Radiation skin burn development time in days.

Radiation skin burns are not the same as thermal/heat burns. It takes up to **3 weeks for the burn to develop, where thermal burns are immediate.**

It's important that patients who receive more than 2000 mGy during an interventional procedure have a follow-up exam to ensure there is no skin burn to treat. **Automated dose tracking software can help manage this important patient care issue.**

Best practices

1. Peak skin dose should be used as an indicator for skin burn risks and the eye dose hazards
2. Only use equipment designed for high radiation dose procedures
3. For equipment intended to be used with procedures > ***3000 mGy***, it should be equipped with dose monitoring equipment
4. Patient dose should be monitored for health risks during the procedure and should be recorded in the patient's medical record
5. Patients should be informed prior to procedures about potential side effects such as burns and followed up if exceeding ***>2000 mGy***
6. Individuals present in the room during procedures should be adequately trained and use protective equipment
7. All staff should wear personal dosimeters under the lead apron and at the neck level

1 Average worker dose NRC report NUREG-0713 Vol. 34 https://www.nrc.gov/docs/ML1412/ML14126A597.pdf
2 Https://www.ncbi.nlm.nih.gov/pubmed/23255753