International Journal of Paramedicine

Published by the National EMS Management Association (USA)

CASE REPORTS

DID YOU SAY MY PATIENT WAS RADIOACTIVE? A CASE REPORT

Patrick D. Horan Jr., NRP*[1,2]

Author Affiliations: 1. Haz Mat 2 Environmental Fire Rescue Company, Manheim, PA, USA; 2. Manheim Township Ambulance Association, Lancaster, PA, USA.

Recommended Citation: Horan Jr, P. (2025). Did you say my patient was radioactive? A case report. *International Journal of Paramedicine*. (12). 156-159. https://doi.org/10.56068/LKUC3713. Retrieved from https://internationaljournalofparamedicine.com/index.php/ijop/article/view/3310

Keywords: radiological, radiation, CBRN, CBRNE, dosimeter, hazardous, hazmat, emergency medical services, EMS, paramedicine

Disclosures: None.

Funding: External funding was not used to support this work.

Received: December 23, 2024
Revised: February 24, 2025
Accepted: February 24, 2025
Published: October 8, 2025

**Corresponding Author*: phoran@mtems.org

ABSTRACT

A local Advanced Life Support (ALS) ambulance was dispatched for a medical patient experiencing a respiratory emergency. Part of the additional information presented from the Public Safety Answer Point (PSAP) reported that the patient had received radioactive therapy, and they were warned not to come into contact with other people due to radiological concerns. The crew on the ALS unit immediately realized that while they were trained in accordance with OSHA 29 CFR 1910.120 at the technician level, they had neither the equipment nor specialized experience in radiation to know best practices for this situation. They requested the Hazardous Materials Duty Officer to assist with medical guidance and radiological understanding. Thankfully the on duty Hazardous Materials Duty Officer (HMDO) was also a paramedic and the designated radiological officer was able to offer clinical guidance, but this incident demonstrated the deficiencies that exist in the paramedic knowledge set and the need for specialized training options. The patient believed they were having an allergic reaction resulting in respiratory distress while the crew were traversing an unknown territory of brachytherapy and how that may be impacting the patient. While the patient was able to be managed relatively easily based on their symptoms with minimally invasive therapies, this highlighted the need for specialized resources and access to experts.

INTRODUCTION

Brachytherapy is a common therapy for specific types of cancer treatment including thyroid cancer. It is well documented that the thyroid has a particular attraction to iodine. For radiotherapy Iodine-131 is typically used to focus the therapy at the thyroid (Wei et al., 2021). The patients' therapy resulted in the successful planting of iodine within the thyroid as confirmed prior to her department from the medical appointment. However, the patient returned home and noticed that she was having trouble breathing, a life-threatening emergency, and promptly called 911. As she was instructed to, she warned the PSAP that she had received radiotherapy, was considered radioactive and, people should be instructed to avoid her. The responding paramedic, unsure of what to do, called for a specialist. As a field paramedic, they found themselves struggling to find the balance between how best to treat the patient while at the same time keeping

themselves and their crew safe, a dichotomy we often find ourselves in EMS struggling with.

CASE INITIAL ASSESSMENT

By fortunate coincidence, the HMDO arrived as EMS was preparing to make contact. The ALS unit provided medical monitoring equipment and the HMDO provided a Geiger counter capable of detecting gamma radiation, a deliberate choice. The patient was a well appearing 77-year-old female who did not appear to be in any acute distress. While crews were advised that contamination was not a concern and minimal monitoring would occur until levels could be established and safe work zones determined. The HMDO, as a credentialed paramedic, started non-invasive monitoring of the patients' vital signs while gathering background readings. This was done to minimize the number of people impacted should the radiation levels be concerning enough. Knowing that contamination was a minimal risk factor, short of an insult to thyroid resulting in the isotope being released. universal precautions would be adequate (Radiation Emergency Medical Management, n.d.). The patient's examination was rather unremarkable, but therapies were deferred to local protocol and patient need by the transporting paramedic. Ultimately, she would receive medical monitoring and a nebulized beta-2 agonist for mild wheezing. The latter therapy was the therapy the transporting paramedic was most concerned with and its impact on contamination and exposure.

RADIOLOGICAL ASSESSMENT

The thyroid was surveyed at both near contact and at one foot distance. This gave the ability to not only give guidance on safe distances but also estimate the crew's exposure. Following the principals of the inverse square law (Ionactive Consulting Limited, 2024), we can calculate the reading that would be found in various distances and thus could safely conclude that the on contact reading was 200 mR/hr (milli-Roentgens per hour) and the one foot reading was 20 mR/hr, which was the most likely dose rate they would receive during general patient care. The transport time to the closest appropriate hospital was estimated to be 20 minutes. Utilizing the dose rate and transport time we calculated their transport dose to be 400 mR. The dose would increase slightly while unloading the patient into the emergency department and transferring at bedside but would not exceed safe limits (Occupational Safety and Health Administration, n.d.) for emergency workers. The crew was given just-in-time training to understand their risks, understand their exposure, and give them guidance on safe practices including As Low As Reasonably Achievable (ALARA) through the act of time, distance, and shielding. Spending the least amount of time, further away from the patient, and with objects between you would significantly reduce their exposure. This meant sitting at the far end of the ambulance near the patients' feet would reduce exposure. Additionally the driver would be better protected as they would not only be further away from the patient but would benefit from partial coverage from the ambulance structure. Crews were advised that any therapy they may wish to do would not cause radiological contamination including aerosol generating procedures but a surgical airway, something considered highly unlikely in this patient, may result in contamination. Once the crews' concerns were placated, they were given contact information for the HMDO should they have follow-up questions or concerns. The patient was transported uneventfully to the hospital and crews returned to service without further issue. Something worth reviewing and a limitation in the re-

sponse model for the HMDO is that they carry a Geiger counter that is designed to evaluate gamma radiation with an optional probe to evaluate contamination with sensitivity for alpha, beta, and gamma. Specifically missing from the equipment cache is an isotope identifier which would have utilized the gamma spectrum released from the isotope allowing the crews to identify the isotope without any question (Smith & Kearfott, 2018). This was not necessary at this time as the patient was able to produce relevant documentation on what isotope was utilized and calculations could be made knowing the specific activity from the reporting documentation. This created a post incident discussion on deployment of specific resources and practical limitations after the incident.

FOLLOW UP AND OUTCOME

Utilizing a software link within the patient care report and the hospital system known as the "Health Data Exchange" allowed prehospital crews to evaluate the notes written by the physicians and discharge summary. For this patient she was monitored in the emergency department for several hours to evaluate for acute changes in condition and allow for the emergency physician to speak with the onsite health physicist for further care planning. The patient was discharged home to self-care.

DISCUSSION AND CONCLUSION

Reading over this case, you can probably tell that this case was, on its surface, both rather unique and, thankfully, a case that could be managed without a great deal of strain. The patient was arguably hemodynamically stable for the duration of care. The crews not only had access to a resource that could provide expert testimonial and respond to the scene to give guidance from both a medical perspective as well as a radiological specialist perspective. In Lancaster County, PA we have a dedicated volunteer hazardous materials team with a duty officer available at all hours and a non-transport paramedic unit that is available to assist in these special cases. This brings to the forefront the very real concerns that exist in a system that does not have access to such a resource. In nearly every response district there is some radioactive risk factor this could be something as simple as your local dentist office, medical office, radiotherapy service, industrial settings including a recycle center or paper mill who all benefit from the usage of radioactive elements. Prehospital providers need to be prepared to manage patients who are either exposed or contaminated with radiological materials. Ask yourself: Is this resource available to me? Had I been dispatched to this incident would I have been able to safely protect myself and my patient from harm? If the answer is no, then a serious discussion needs to be had about how best we can keep our community safe.

PATIENT PERSPECTIVE AND CONSENT

Sadly, in reaching out to the patient after the incident to gather perspective and consent it was determined the patient had expired sometime in the years following therapy.

REFERENCES

Ionactive Consulting Limited. (2024, March 17). *Inverse square law*. https://ionactive.co.uk/resource-hub/glossary/inverse-square-law

Occupational Safety and Health Administration. (n.d.). Radiation emergency preparedness and response - response. *U.S. Department of Labor*. Retrieved December 23, 2024, from https://www.osha.gov/emergency-preparedness/radiation/response

Radiation Emergency Medical Management. (n.d.). Personal protective equipment (PPE) in a radiation emergency. *U.S. Department of Health and Human Services*. https://remm.hhs.gov/radiation_ppe.htm

Smith, T., & Kearfott, K. J. (2018). Practical considerations for gamma ray spectroscopy with NaI(Tl): A tutorial. *Health Physics, 114*(1), 94–106. https://doi.org/10.1097/HP.0000000000000804

Wei, S., Li, C., Li, M., Xiong, Y., Jiang, Y., Sun, H., Qiu, B., Lin, C. J., & Wang, J. (2021). Radioactive iodine-125 in tumor therapy: Advances and future directions. *Frontiers in Oncology, 11*, Article 717180. https://doi.org/10.3389/fonc.2021.717180