

Ayat Aljawad, Safeya Al Hadi and Leen Shbeeb

Academic Supervisor: Dr. Entesar Dalah & Co-supervisor: Dr. Abdulmunhem Obaideen
Medical Diagnostic Imaging Department, University of Sharjah, United Arab Emirates

Introduction

In the past few years, medical radiation risk awareness has significantly increased for both adults and children including neonates [1]. Diagnostic x-ray utilizing ionizing radiation is done regularly to critically ill infants in NICU where incubators are usually kept close to each other with no fixed distance in-between, which can result in a significant radiation dose to some neonates [2]. The application of ALARA and inverse square law is mandatory to reduce backscattered radiation. [3].

Objective

To measure the backscattered radiation reaching an adjacent neonate during a radiographic procedure at different distances in a NICU of the University Hospital Sharjah.

Materials and methods

- 1- Portable x-ray machine
- 2- SVLD probe
- 3- RadEye G probe
- 4- Incubator

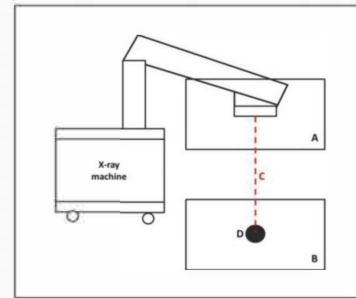


Fig 1: Demonstrates the experiment: (A) incubator under examination, (B) adjacent incubator receiving scattered radiation, (C) distance between the center of the x-ray tube to the center of the adjacent incubator, (D) Dose rate probe.

Results

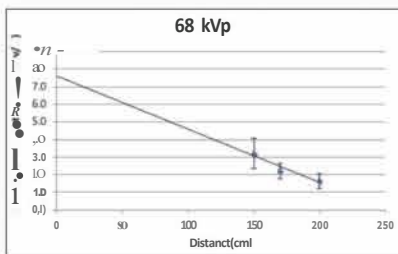


Fig 2 A strong negative correlation between backscattered radiation generated with 68 kVp and distance ($r = -0.9621$) using Pearson coefficient correlation.

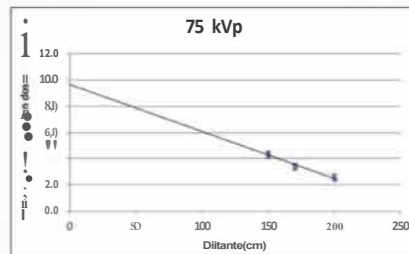


Fig 3 A strong negative correlation between backscattered radiation generated with 75 kVp and distance ($r = -0.9964$) using Pearson coefficient correlation.

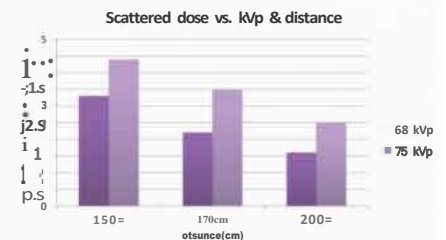


Fig 4: Demonstrate a significant statistical difference ($p < 0.05$) using I-test between scattered dose rate and distance using 68 & 75 kVp.

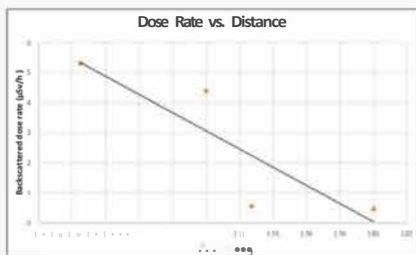


Fig 5 A strong negative correlation between backscattered radiation generated with different distance ($r = -0.8394$) using Pearson coefficient correlation.

Conclusion

Backscattered radiation decreases with increasing the distance from the primary X-ray beam. Further, backscattered radiation seems to increase with increasing the operating kVp.

Acknowledgment

We would like to express our most profound appreciation for the staff in the Department of Medical Diagnostic Imaging at the University Hospital Sharjah and our sincere gratitude to Mr. Osama Taqatqa, the radiation safety officer from the Nuclear Engineering department at the University of Sharjah for their continuous motivation and support.

Selected references

- [1] Charles et al. (2005). American journal of roentgenology, 184:373-374.
- [2] Cheng-Chung et al. (2010). Elsevier, 51(6):311-319.
- [3] Fazel et al. (2009). N Eng J Med, 361:849-857.