



# Is my baby safe during my pregnancy being at work in a Radiology environment?

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## Introduction

Exposure to ionising radiation and its perceived negative effects on childbearing is a common psychological concern of female staff working in Radiology (X-Ray) departments. The psychological burden may be reduced through better understanding of radiation safety and protection measures already in place.

It is mandatory under the Radiation Protection act that all radiation workers in Singapore are monitored regularly and provided with their radiation exposure dose record. Radiation dose limit for pregnant staff tracked via their thermoluminescent dosimeter (TLD) readings (worn at waist level) from the date of known pregnancy till delivery.

The aim of this article is to allay the often unfounded perceived fears of radiation exposure to gravid female staff through reiterating the fundamentals of radiation physics. We also highlight departmental protocols and recommendations aimed at reducing radiation exposure.

## Background

The departmental Radiation Safety Officer (RSO) is responsible for crafting, updating, disseminating/educating and enforcing policies in relation to potential work-related risks, and recommended dose limits for both mother and unborn baby. RSO also reminds pregnant staff to wear their TLD around the waist level while at work.

Once a radiation staff declares her pregnancy, the department roster committee makes a point to avoid rostering her to areas of high scatter radiation, e.g. fluoroscopy and angiography; to roster her to areas of lesser scatter radiation, e.g. general radiography and mammography.

The International Atomic Energy Agency (IAEA) stated that pregnant staff may continue working in the X-ray department as long as there is reasonable assurance that the foetal dose can be kept below 1 mGy during the pregnancy. The department should also ensure that the pregnant staff is not subjected to unnecessary discrimination. It is the responsibility of both worker and the employer to maintain a safe workplace environment (2).

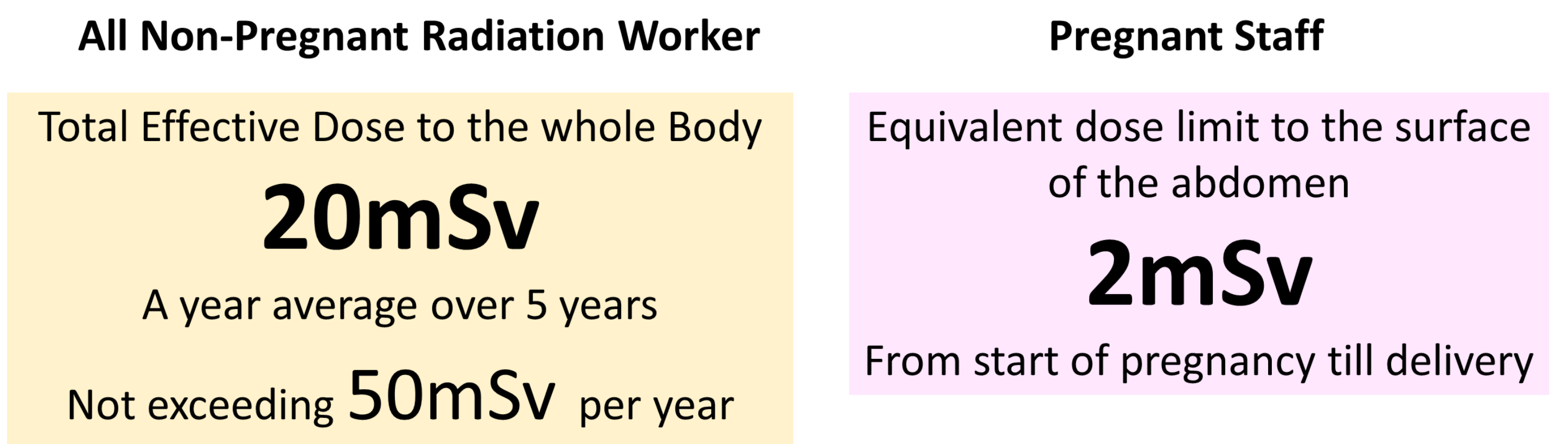


Figure 1. Dose limits for radiation workers and pregnant staff (1)

## Methodology

Pre- and post-radiation safety refresher course survey questionnaire were administered to the four pregnant staff in our department at the point of study. The three segments of the questionnaire include: perception towards working in the radiology department, knowledge of the current radiation dose limit for pregnant staff, and a few recommendations on safe practices.

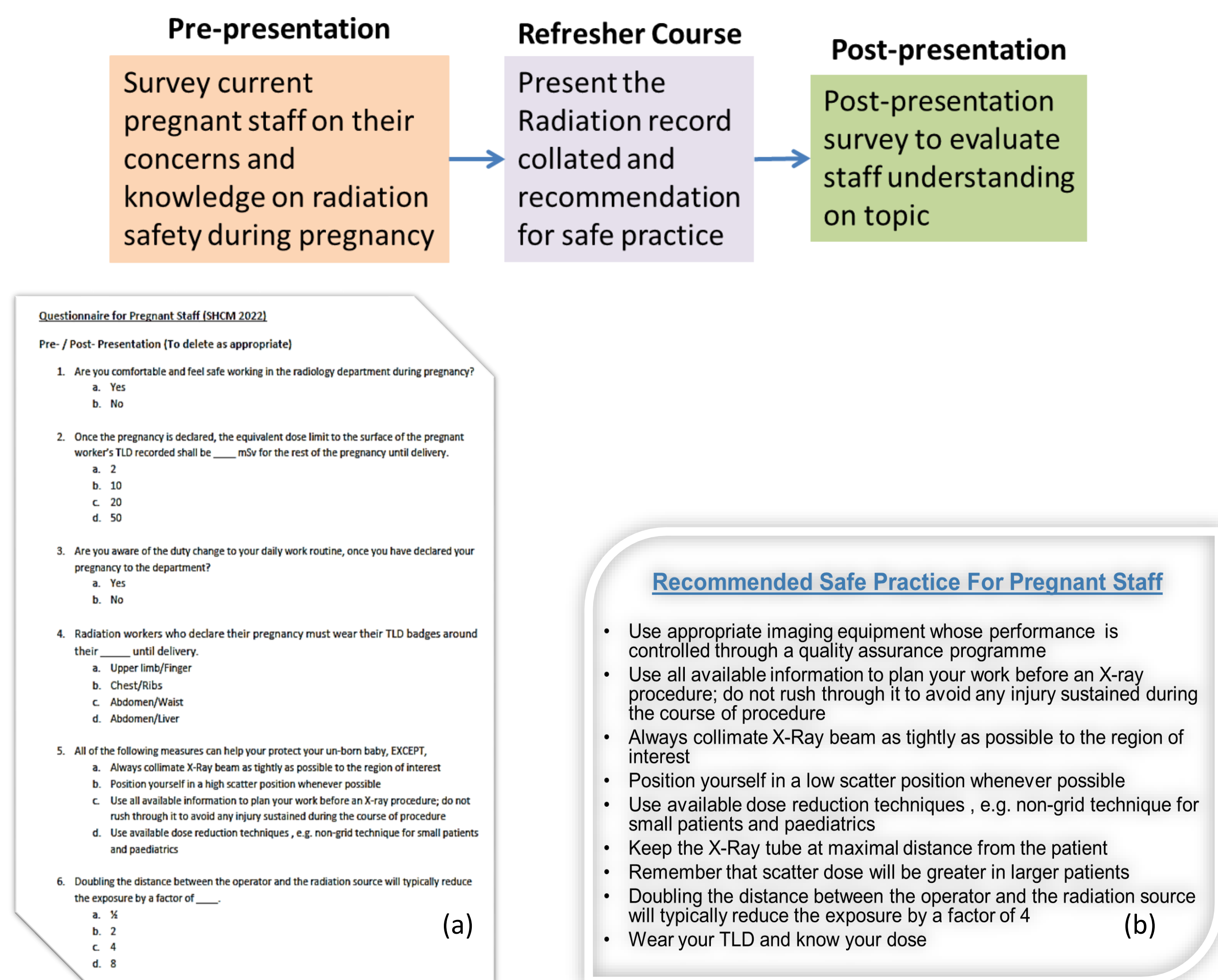


Figure 2. Sample questionnaires (a) and presentation slide (b) presented to pregnant staff

Data, in the form of a chart of the radiation exposure dose recorded for the twenty five pregnant staff working in the department between 2016 – 2021, was also presented. Regulatory radiation safety limits and safe practice were shared with these workers.

## Results

NEA Radiation Dosage Recorded from Pregnant Staff's TLD Working at DDII (Between 2016 to 2021)

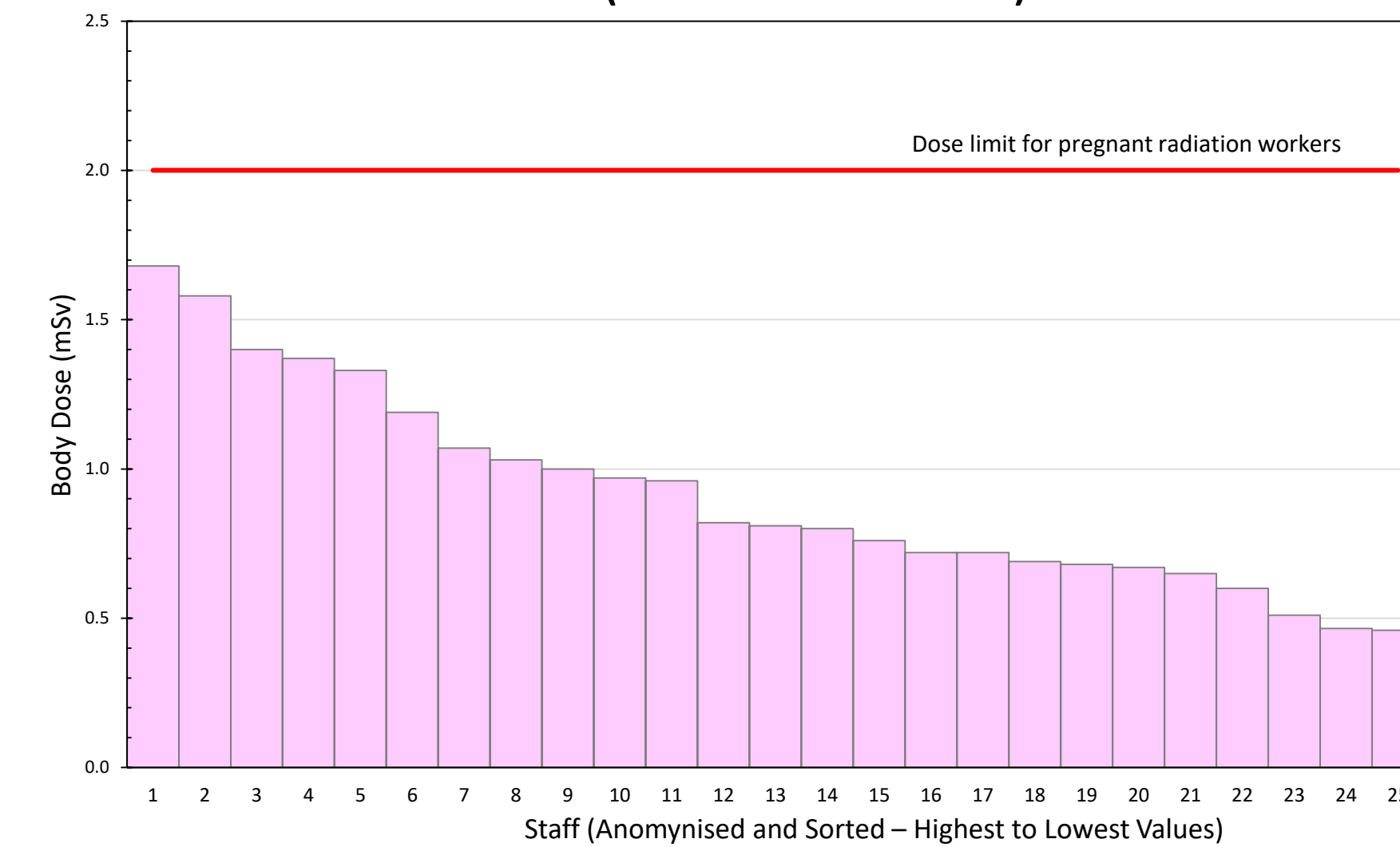


Figure 3. The chart represents the TLD readings for twenty five radiation staff working in the Department of Diagnostic Imaging and Intervention (DDII), KK Women's and Children's Hospital for the period between 2016 to 2021

From Figure 3, the minimum and maximum readings were charted at 0.46 mSv and 1.68 mSv respectively. 36% (9 persons) of the pregnancy doses are above 1 mSv, while 64% (16 persons) are registered below 1 mSv.

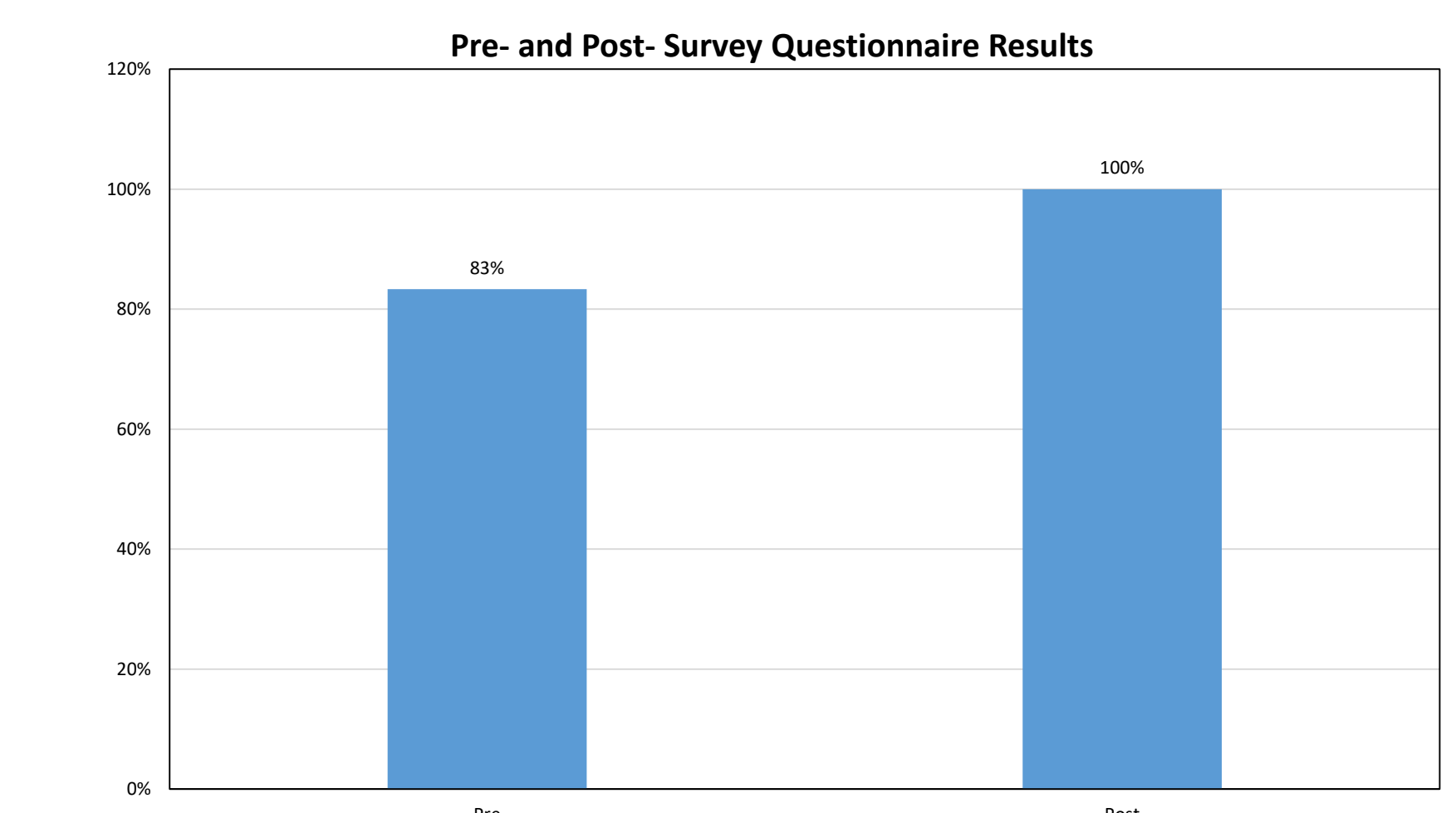


Figure 4. Percentage of correct responses for the survey questionnaire replied by the pregnant radiation workers. All four pregnant staff achieved a 100% results after refresher course

From Figure 4, 83% of the respondents received were correct before the presentation; while an impressive 100% correct answers was achieved after the presentation.

All respondent replied correctly the equivalent dose limit to the surface for the pregnant staff, and they were comfortable working in DDII while carrying their unborn babies. Pregnant workers also understood the importance to wear their TLD at their lower abdomen (waist) level while at work.

All respondent also acknowledged that the department has made arrangements to change their daily work routine, ever since they had declared their pregnancy.

## Discussion

For our departmental initiative, when a medical radiation worker is known to be pregnant, she will be transferred from modality of high scattered radiations such as fluoroscopy and interventional radiology, to some other areas where there is less scattered radiation, mainly in the general radiography or mammography field. In nuclear medicine department, a pregnant staff will be restricted from spending a lot of time with the radiopharmaceuticals.

National Environment Agency (NEA) TLD radiation dose report of the twenty five pregnant radiation workers were collated over a period of six years, between 2016 till 2021. This audit exercise had revealed that radiation dose received by these radiation workers were below the 2 mSv limit during the entire pregnancy period.

This study involves retrospective reviewing of NEA dose report, and the pre- and post-survey of current four pregnant workers by going through the refresher course has garnered positive response. After refresher talk, the four pregnant staffs had a deeper understanding of radiation safety and they felt assured that their working environment was safe for them and their pregnancy.

We only focused upon the four staff who was pregnant at the time of study. With this positive note, we may conduct refresher course for all future pregnant staff, to ally any anxiety that may arise.

## Conclusion

Through our pregnant radiation dose audit exercise, we proved that the radiation dosage captured by the department's pregnant staff were lower than the regulatory limits set by the local governance body. The resulting radiation risk is minimal compared to other risks that may present during a pregnancy.

The survey showed that the refresher course was effective. The refresher course has proven to enhance their knowledge about radiation safety; and the recommended safe practices while they are at work were valuable.

## Acknowledgment

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## Reference and Bibliography

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