



# Mobile X-Ray Units: Frequency of Use



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## Introduction

**Mobile Radiography units are used to examine patients at the bedside when they cannot be moved to the Radiology Department.**

**The image quality from such examinations is not as good as that obtained from the Radiological Department examinations, mainly due to the difficulty in the correct set up of the equipment in relation to the patient position in bed.**

**Due to the fact that mobile x-ray units are used at areas not specifically designed for X-ray usage, It is necessary to take additional precautions in order to minimise the dose to the patient under examination, as well as to the neighbouring patients, the ward staff and the radiographer.**

**There are few, if any, publications that give data regarding the quality of the image, the dose to the patient and also the frequency of use of such examinations.**



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## Introduction

From available publications<sup>1</sup> it is evident that:

- the image quality is sub-optimal to totally unacceptable,
- there is a large range of patient doses for the same examination
- there are no data on the usage frequency of such procedures.

## Purpose

To investigate the frequency at which the mobile X-ray radiography units are used at the Nicosia General Hospital (500 beds) in relation to the justification and type of the examinations performed at each ward, the procedure parameters and patient dose, in order to assess the overall practice in terms of quality of service and radiation protection.

## Materials and Methods

Five mobile x-ray radiography units (**BMI/SMAM Mobicdrive AR30**) are at present in use at the hospital to perform bedside X-ray examinations.



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## Materials and Methods

Computed Radiography Cassettes (**Agfa MD 4.0 General Code 34**) are used and these are read by Computed Radiography Digitizers (**Agfa CR 75.0 Digitizer**).

Forms completed by the radiographers performing before each examination have been inspected for data collection.

Date, patient identification, ward, type of examination and procedure parameters are included in the data collected.

The Entrance Surface Dose (ESD) as a function of mAs and kVp, was estimated from the characteristic curve of each unit.

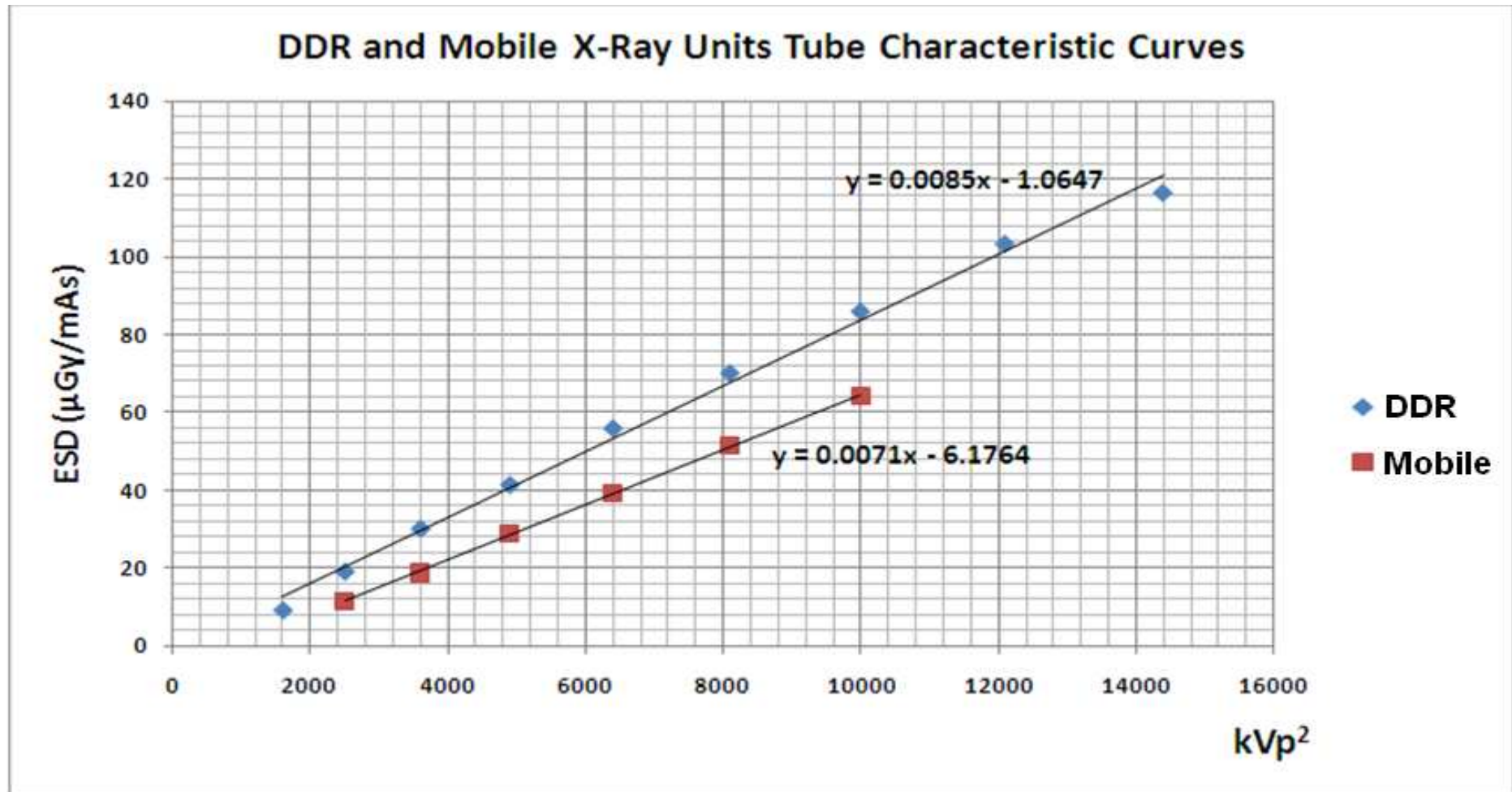
For comparison purposes, the image quality and dose for each type of examination have been compared with similar examinations performed at the X-ray Department of the Hospital using Direct Digital Radiography (DDR) units (**EIDOS MEDCAL 3000**).



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## Materials and Methods





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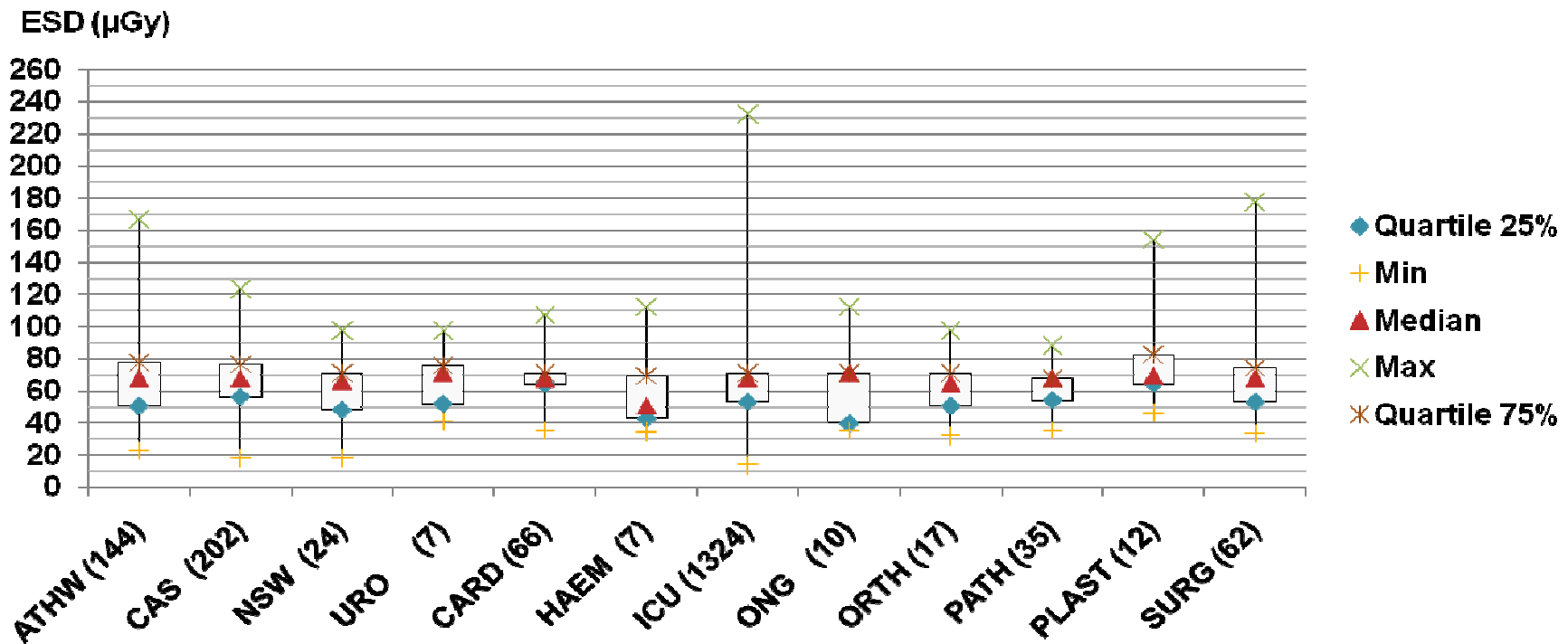


## Results

Data collected from 1910 examinations were analysed.

The majority of them (65%) were performed at the Intensive Care Unit and 91,2% of these were chest examinations.

### Anterior – Posterior Chest Radiographs





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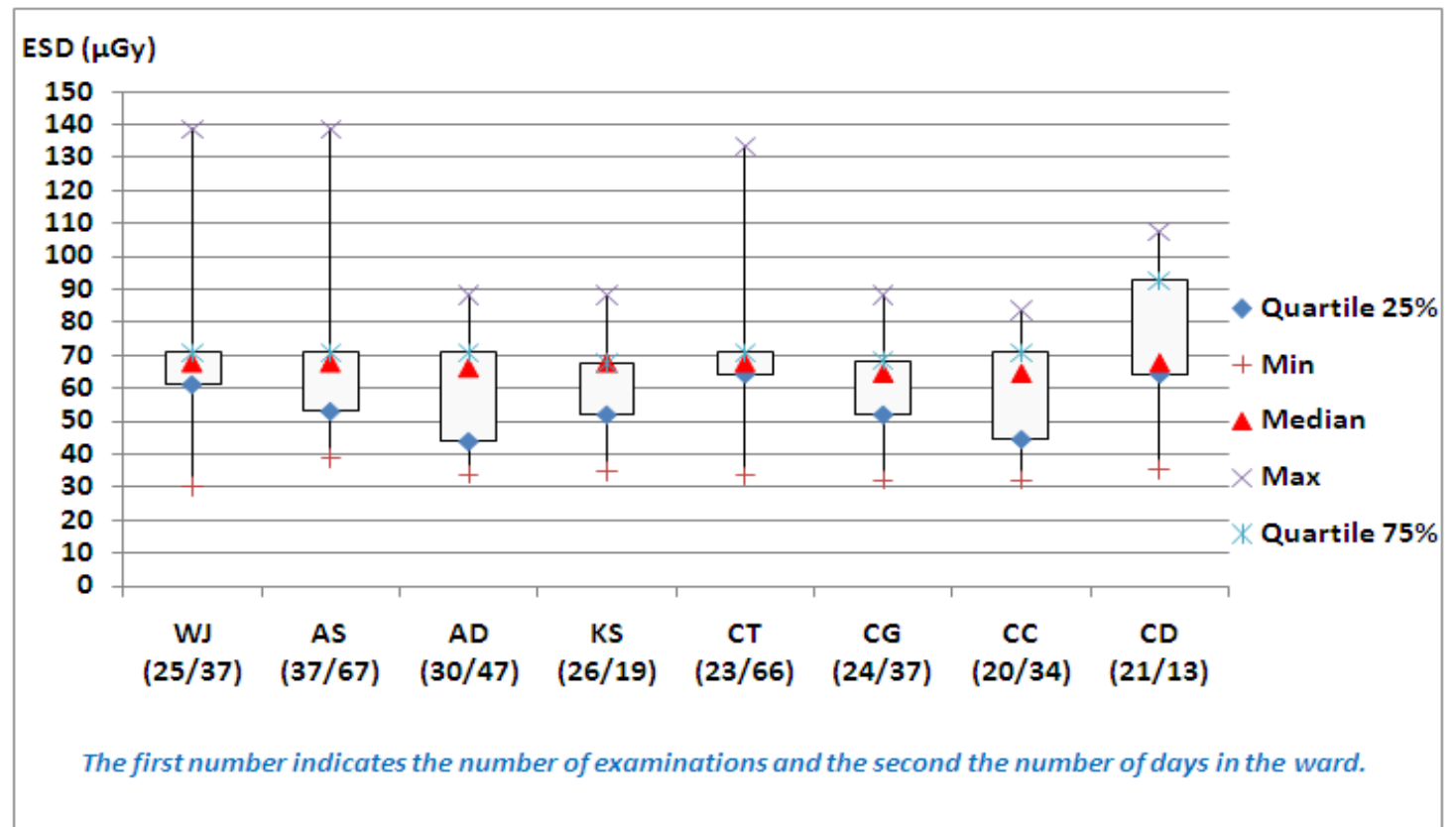


## Results

For this particular examination the ESD ranged from 18 to 234  $\mu\text{Gy}$ , whereas the mean dose was 60  $\mu\text{Gy}$ .

### Variation of dose for CXR on the same patient

There was also a large variation of doses for this examination for the same patient.





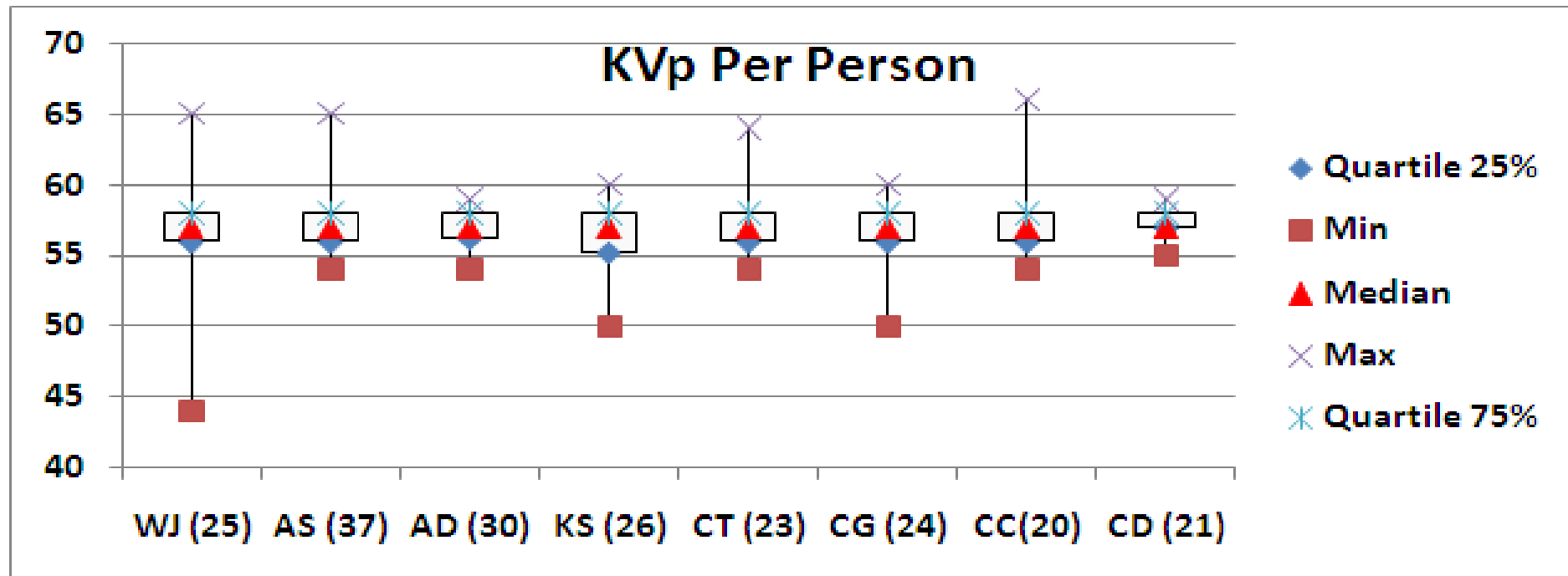


# Mobile X-Ray Units: Frequency of Use



## Results

This was mainly due to the inconsistency in the patient set-up and the low kVp technique employed. The curve below shows the variation in kVp for CXR on the same patient.







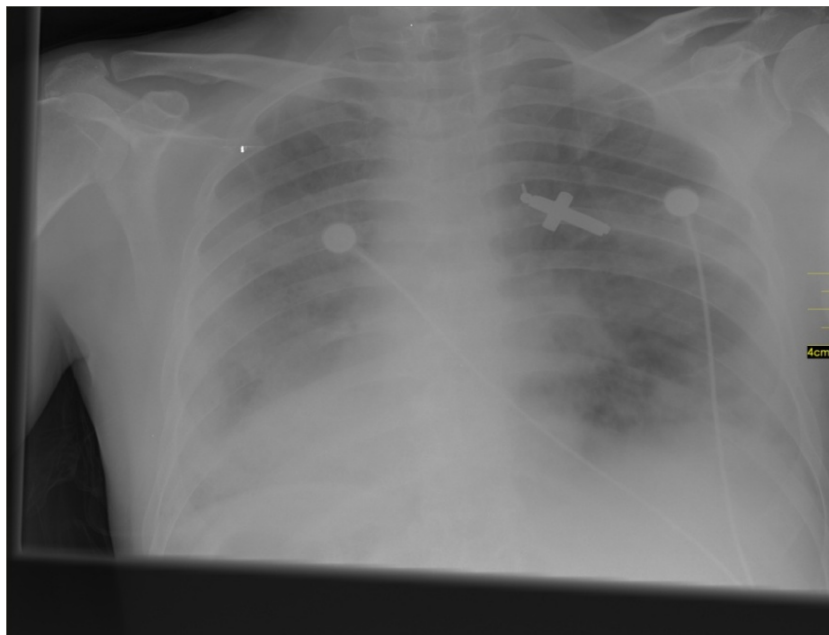
# Mobile X-Ray Units: Frequency of Use



## Results

The image quality was also poorer than the respective images from a DDR system.

This is due to the fact that for the same examination there is inconsistency in the patient set up, exposure parameters and to the fact that with mobile units an anti-scatter grid is not used, leading to very poor image quality.



**Mobile X-Ray Image**



**DDR X-Ray image**



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## Conclusions

- 1) Further investigation is needed regarding the frequency of use of mobile x-ray radiography units in relation to patient flow, in order to identify excessive and unjustified use (benchmarking).
- 2) There is a need for standardisation of the bedside X-ray examination protocols
- 3) There is a need to use high kVp techniques together with anti-scatter grids
- 4) There is a need to review the ICU protocols with the aim to reduce the number of Chest X-Ray examination referrals.
- 5) There is a need to establish a quality index as regards the number and quality of bedside examinations.
- 6) There is a need for the further education and training of all the healthcare professionals.

## References

- 1) P. D. Simpson, C. J. Martin, C. L. Darrach, “A study of chest radiography with mobile units”, *BJR*, 71 (1998), 640-645.