

Radiation Protection Awareness among Dentists in the United Arab Emirates

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Introduction

Dental radiographs account for approximately 21% of the estimated 2500 million radiographs taken annually. The effective dose equivalent is estimated at 26 μSv (about 3.3 days of natural background radiation).

Recent studies suggested that:

- There is an overall lack of knowledge and understanding among dentists in relation to x-ray equipment used, radiographic techniques & procedures, and radiation safety & protection guidelines, limits and standards.
- Inadequate and outdated x-rays units were found to be still in use in some clinics.
- Studies have reported that the estimated yearly effective dose seems to exceed annual dental limits.
- Available measures for reducing radiation dose are NOT commonly practiced in dental clinics.
- Higher than expected doses were delivered because of incorrect film processing and roentgen unit malfunctions.



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Sharjah
United Arab Emirates
UAE



UAE is ranked as Level I Health Care Nations by WHO

Estimated No of dental clinics in UAE = 364

Clinic/city Distribution	Dubai	136 (37%)
	Abu Dhabi	89 (25%)
	Sharjah	59 (16%)
	Al Ain	37 (10%)
	Other Cities	43 (12%)

Objectives:

1. To assess awareness level among UAE dentists of:

- x-ray units types, settings (mA, kVp, ...) and relation to dose delivered in various dental radiographs.
- Radiation safety & protection guidelines, regulations, dose limits and procedures.

2. Calculate the annual dose equivalent for dental professionals working in clinics.



Materials & Methods

A Survey containing 22 questions on:

1. Demographics
2. Knowledge of X-ray machine settings (kVp, mA & exposure time).
3. Awareness of delivered dose & annual effective dose
4. # of monthly radiographs & work habits
5. Awareness of radiation safety & protection regulations and annual dose limits for dentists.

247 surveys were distributed – 183 were collected (74%)

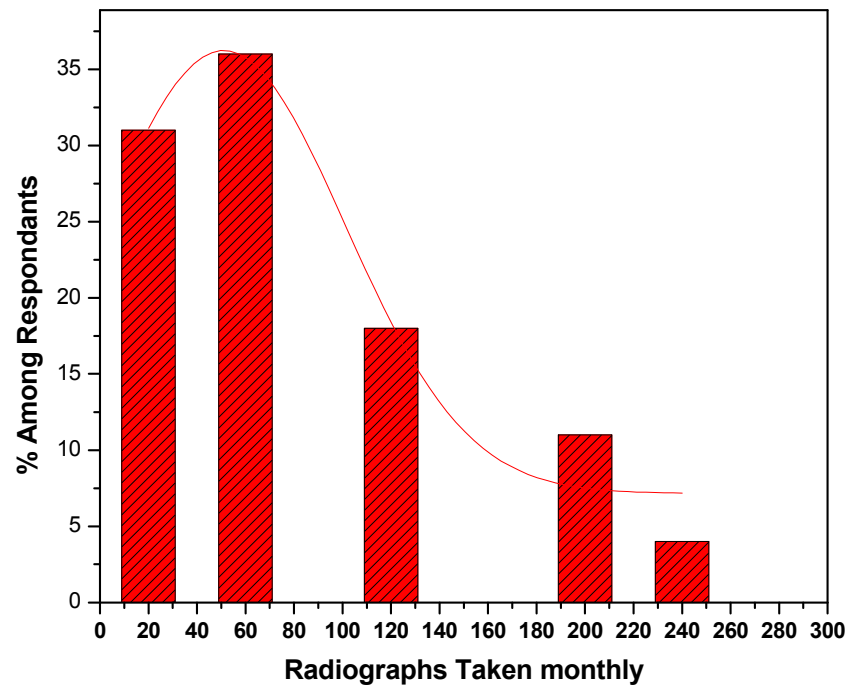
A copy of the survey can be obtained from the author

		No. of Respondents & %
Gender	Male	81 (44.3%)
	Female	102 (55.7%)
City	Dubai	62 (33.9%)
	Abu Dhabi	41 (22.4%)
	Sharjah	46* (25.1 %)
	Al-Ain	13 (7.1%)
	Other Cities	21 (11.5%)
Years of Experience	<10 Years	64 (35%)
	10 - 20 Years	95 (51.9%)
	> 20 Years	24 (13.1%)

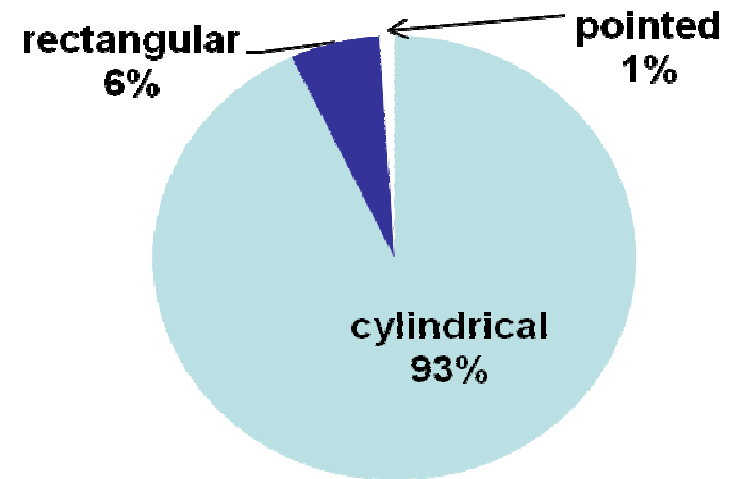
Results

of monthly radiographs

Approximately 70% dentists administer more than 60 radiographs monthly



Types of radiographic units



Shape of the x-ray tube head of intraoral radiographic equipment?

Timer type?

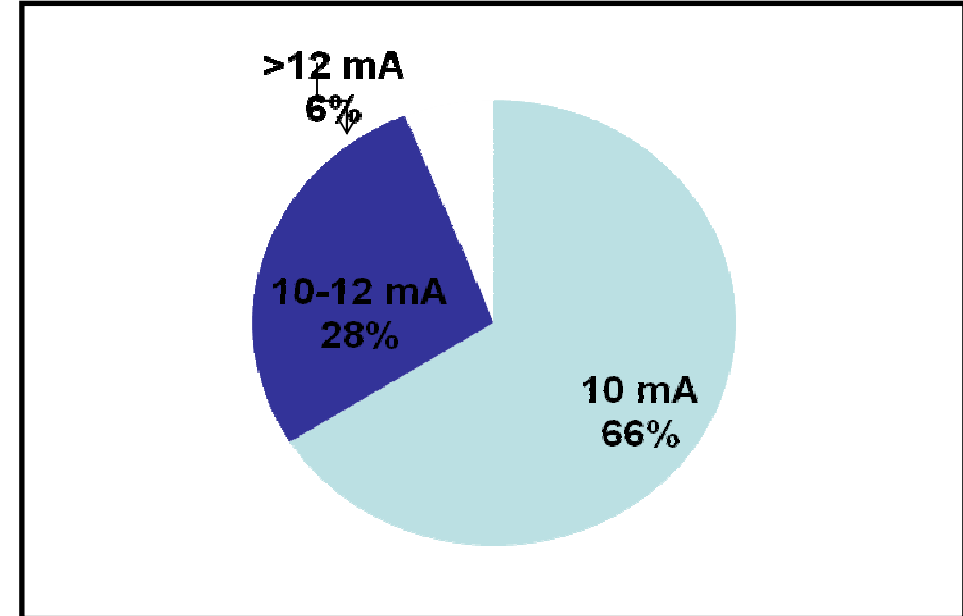
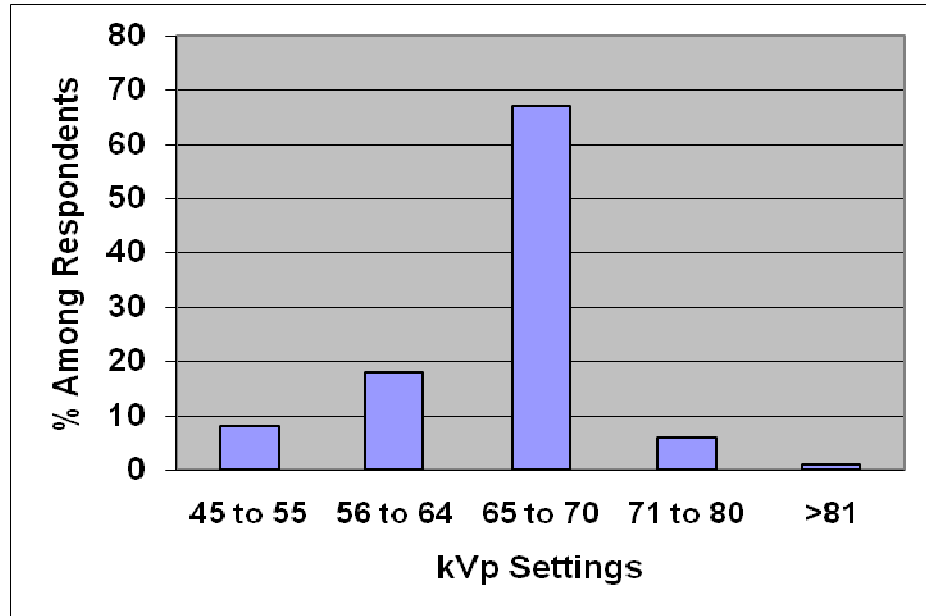
Electric	85%
Manual	15%



Employed Radiography Settings

kVp

mA



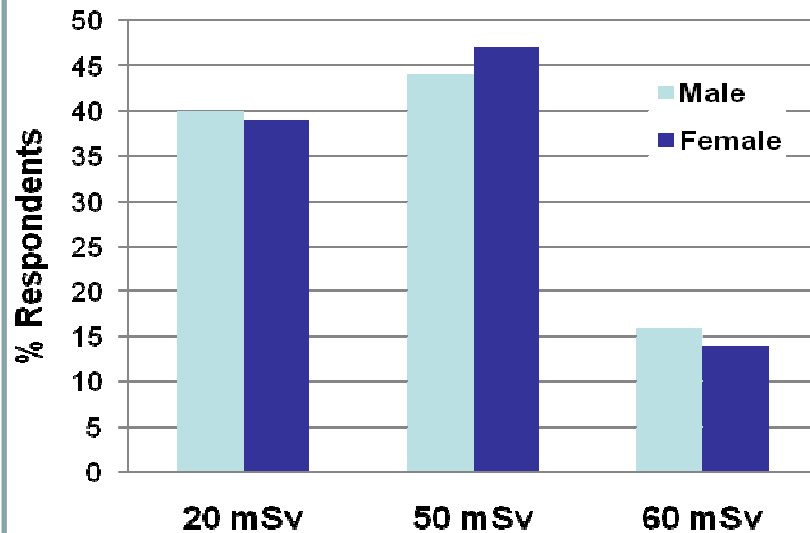
Exposure time ranges from 0.1 sec to 5 seconds

Most common settings: 65-70 kVp, 10 mA and 0.3 seconds



Dentists Knowledge of dose limits and basic radiation safety protection (ALARA)

What is the annual radiation exposure limit for a dentist?

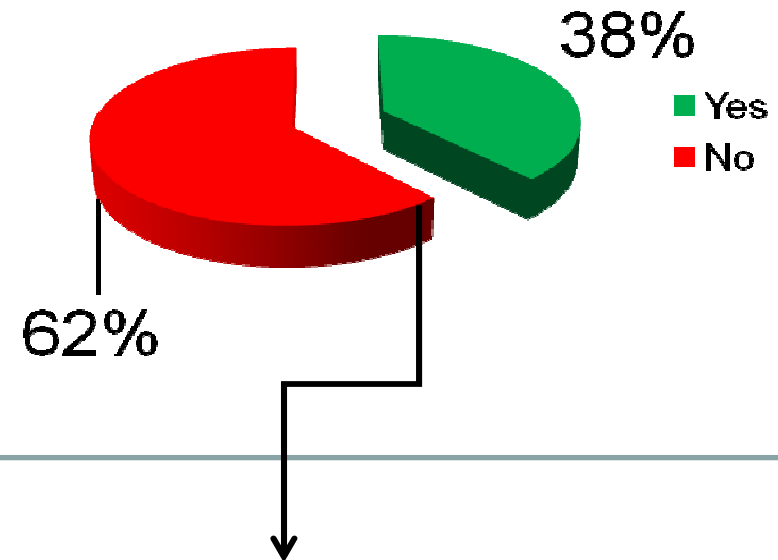


1) Maximum permissible annual dose equivalent for dentists, assistances and hygienists is 50 mSv (whole body)

Principles of dental imaging. Olaf E. Langland, Robert P. Langlais, John W. Preece. Page 316.

2) Maximum permissible annual dose equivalent for dentists is 20 mSv/year (ICRP).

Do you know what is meant by ALARA?

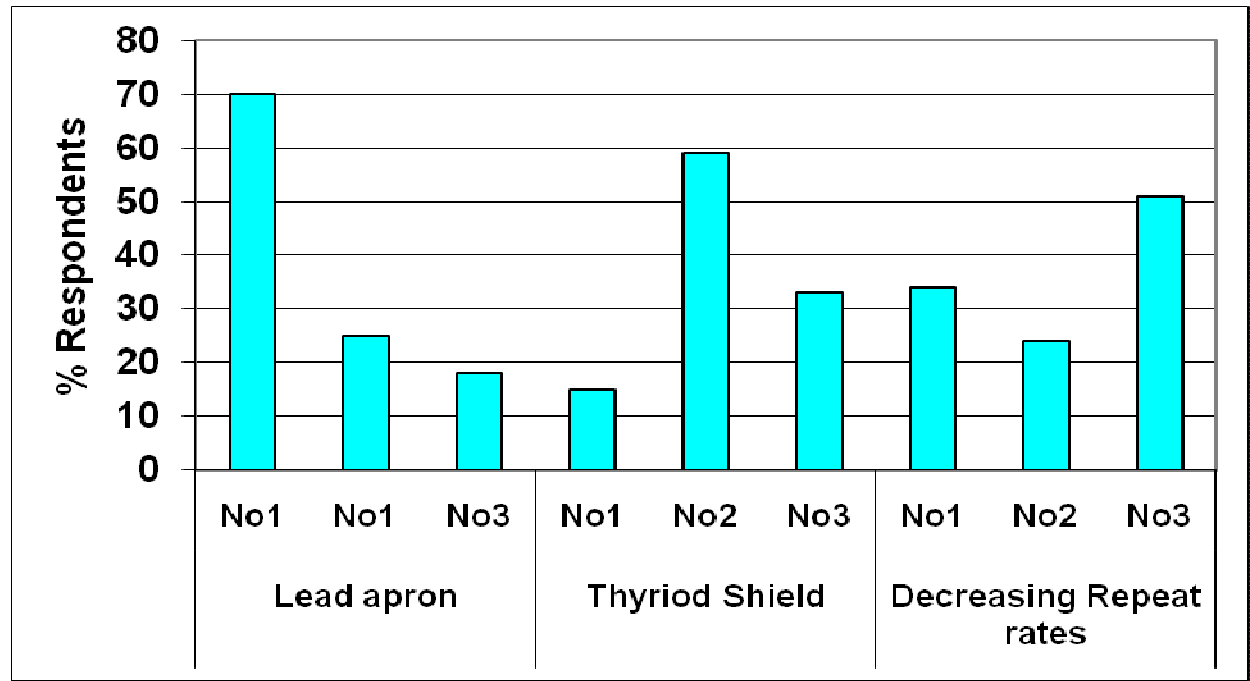


Only 41% among those who answered yes, knew what each letter in the acronym ALARA refers to!



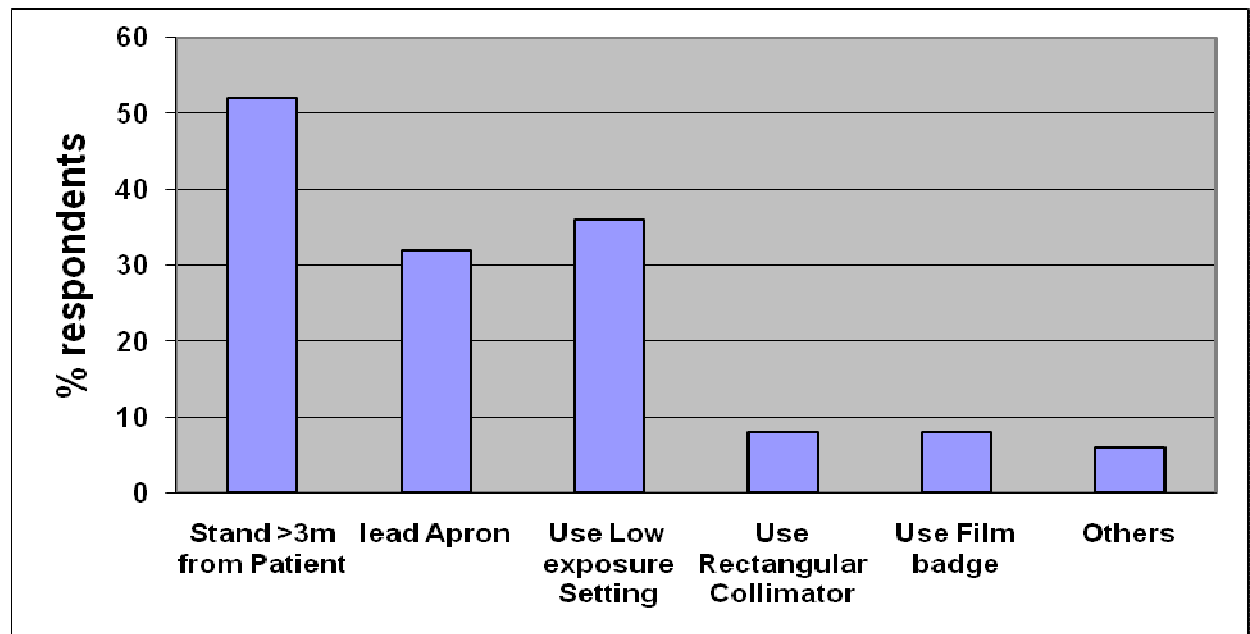
What is the most effective method for protecting the patient?

- Lead apron Rank: (1, 2 or 3)
- Lead thyroid shield Rank: (1, 2 or 3)
- Decreasing repeat rate Rank: (1, 2 or 3)



What other precautions you take to protect YOURSELF from radiation during exposure?

- I keep a distance of >3m from the patient.
- I wear a lead apron.
- I use the lowest exposure setting possible.
- I use rectangular collimator.
- I use film badge.
- Other:



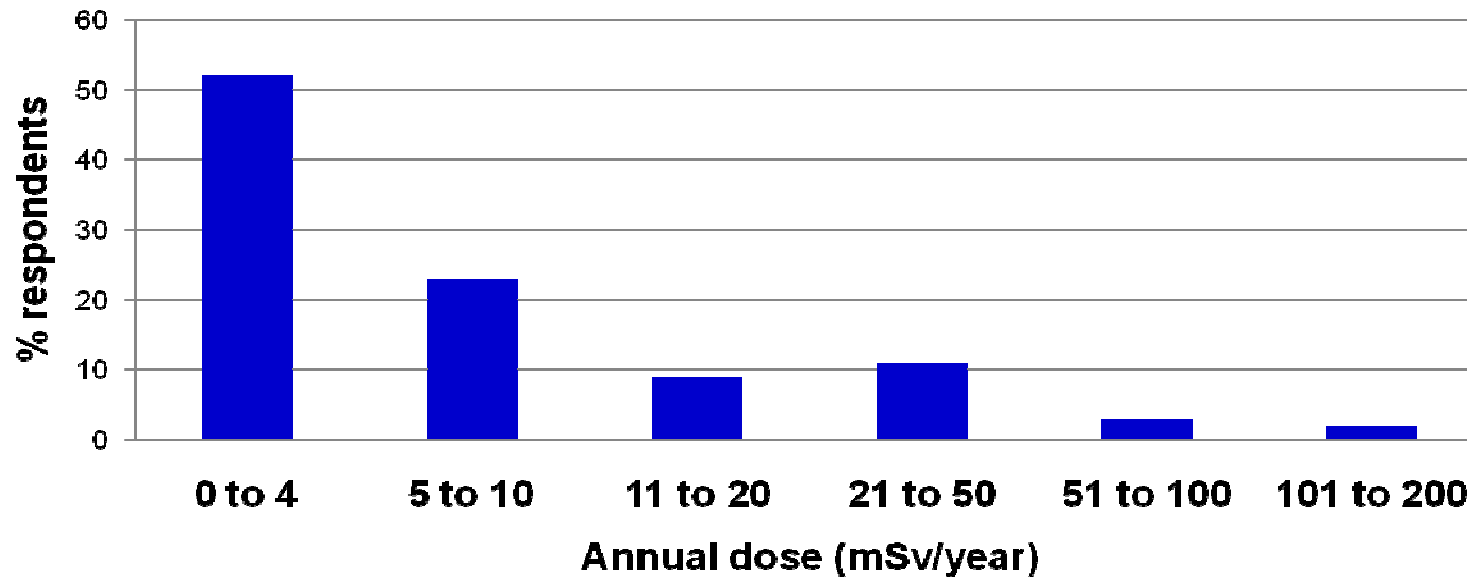
Calculating the Annual Dose Equivalent

Annual Dose (mSv) = [Dose for one exposure with a certain image receptor × number of exposures per year × % of radiation coming through the wall] / [distance]²

See: Jacobs et al (2004) *Dentomaxillofacial Radiology* 33, 334-339

For UAE Dentists: 84% receive an annual dose equivalent less than 20 mSv/year, which is way below the permissible limit of 50 mSv/year[1] and the conservative ICRP limit of 20 mSv/year.

(See: *Principles of dental imaging*. Olaf E. Langland, Robert P. Langlais, John W. Preece. Page 316)



Median = 10 mSv/year



Conclusions:

- The results of our survey revealed that there is an overall lack of knowledge and understanding amongst UAE dentists in relation settings, radiation protection & safety procedures and radiation standards & limits.
- The estimated annual effective dose was found to be less than the stipulated conservative limits set by ICRP.
- Radiation awareness workshops, training programs and/or refreshing courses are recommended to improve awareness among dentists working in UAE dental clinics.



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