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GUIDELINE FOR USE OF RADIOGRAPHIC GRID RATIO

The guideline outlines the requirements for the use of grids to enhance contrast and improves the quality of medical X-Ray images.

Document History

Final Version	Reason for Amendment	Effective Date
0	First issue and published for implementation	October 2009
1	<ul style="list-style-type: none">- Content structured on the latest SAHPRA Guideline Template- A unique document number SAHPGL-RDN-XR-20 allocated to this Guideline	September 2022

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Glossary

Abbreviation/ Term	Meaning
kVp	Kilo Voltage peak
Attenuation	Is the reduction of X-Ray intensity due to absorption or scatter
Grid ratio	is the ratio between the height of the lead strips and the distance between them
Regulations	Regulations relating to the Control of Electronic Products (No R1332 of 3 August 1973)
X-Ray source	An electronic device that is designed, manufactured, or assembled with the primary purpose of producing ionizing photon radiation.
Bone radiography	Imaging technique dedicated in imaging for diagnosis purpose of the bones
Barium studies	are used to diagnose abnormalities of the gastrointestinal (GI) tract, such as tumours, ulcers and other inflammatory conditions.
Chest radiography	Is the imaging of the chest cavity for medical diagnosis inside the chest.

1. INTRODUCTION

Grids are used to improve contrast by absorbing scatter radiation before it reaches the film. Scattered radiation is the biggest contribution factor to poor image quality which may lead to poor diagnosis. The use of an X-Ray grid between the X-Ray source and the film or plate enhances the image which becomes clearer and more detailed.

1.1 Purpose

The basic purpose X-Ray grid use is to enhance the contrast and quality of the medical image by removing the scatter radiation

1.2 Scope

The scope of this guideline is to show users of medical X-Ray devices how the use of grids can improve image quality for diagnosis.

2. LEGAL PROVISION

The Hazardous Substances Act, 1973 (Act 15 of 1973) and Regulations (No R1332 of 3 August 1973) govern the safe use of X-Ray equipment in South Africa.

3. GUIDELINE AND REQUIREMENTS

3.1 Grid Design

3.1.1 A radiographic grid consists of lead strips separated by X-Ray transparent spacers.

3.1.2 Grid ratio is the ratio between the height of the lead strips and the distance between them.

3.1.3 The effectiveness of the grid is determined by several parameters of which the attenuation of scatter radiation is the most important. This attenuation should be high. It is also important that the primary beam attenuation is low, as this affects the exposure time and the consequent dose of radiation to the patient.

3.1.4 The quantity of scatter radiation generated by various objects and at different voltages plays a major role in the selection of a grid ratio.

3.1.5 Usually 8:1 grids give adequate results below 90 kVp. Above 90 kVp 12:1 grids are preferred.

3.2 Requirements

- 3.2.1 A grid with a minimum grid ratio of 10:1 is required for a basic radiological system. In certain circumstances a grid ratio of 8:1 may be acceptable.
- 3.2.2 When only extremities, X-Ray examinations below 90 kVp technique and chest examinations are being conducted, a minimum 8:1 grid ratio is acceptable.
- 3.2.3 In cases where more than one grid is being used the following table can be used as a guideline. It must be used as a guide because there are many variables that will affect the ultimate choice.

Table 1: Grid Table

Examination	KV Limit	Grid Ratio
Bone radiography	90	8:1
	110	12:1
	150	16:1
Barium studies	100	8:1
	120	12:1
	150	16:1
Chest radiography	120	6:1
	130	8:1
	150	10:1

4. REFERENCES

The following related documents are referenced:

- 4.1 WHO: 1994 (RAD/94.1) WHIS-RAD – World Health Imaging System for Radiography.
- 4.2 South Africa, 1973. Hazardous Substances Act, 1973 (Act of 15 of 1973). <https://www.sahpra.org.za/radiation-control-acts-and-regulations/>
- 4.3 South Africa, 1973. Regulations Concerning the Control of Electronic Products. Regulation Gazette No 3991. <https://www.sahpra.org.za/radiation-control-acts-and-regulations/>
- 4.4 Guideline for Code of Practice for Users of Medical X-Rays Equipment (SAHPGL-RDN-XR-02).

<https://www.sahpra.org.za/radiation-control-guidelines-and-codes-of-practice/>

- 4.5 SMIT X-RAY GRIDS: Influence of Stray Radiation.
- 4.6 Christensen's Physics of Diagnostic Radiology - 4th Edition.

5. VALIDITY

This guideline is valid for a period of 5 years from the effective date of revision and replaces the old guideline for Radiographic Grid Ratio, revised October 2009. It will be reviewed on this timeframe or as and when required.