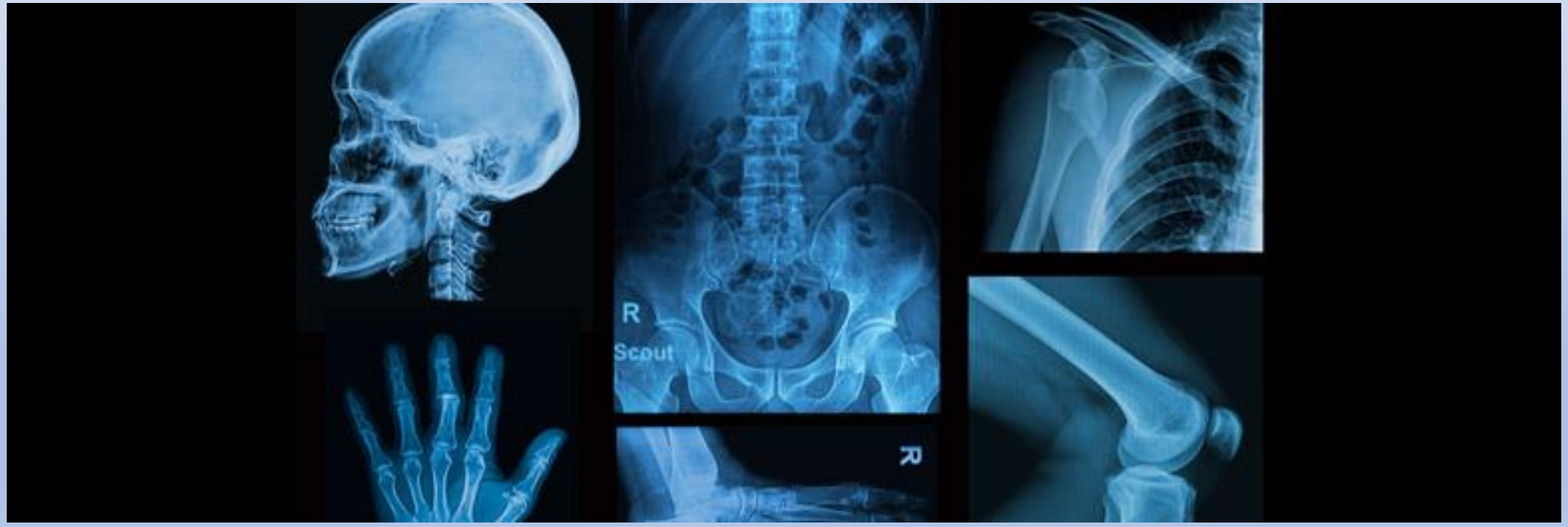
GREETINGS
ON
WORLD PATIENT SAFETY DAY

RADIOLOGY - EARLIER



RADIOLOGY → RADIODIAGNOSIS

RADIOLOGIST IN PRESENT DAY

Patient Safety in Radio-Diagnosis

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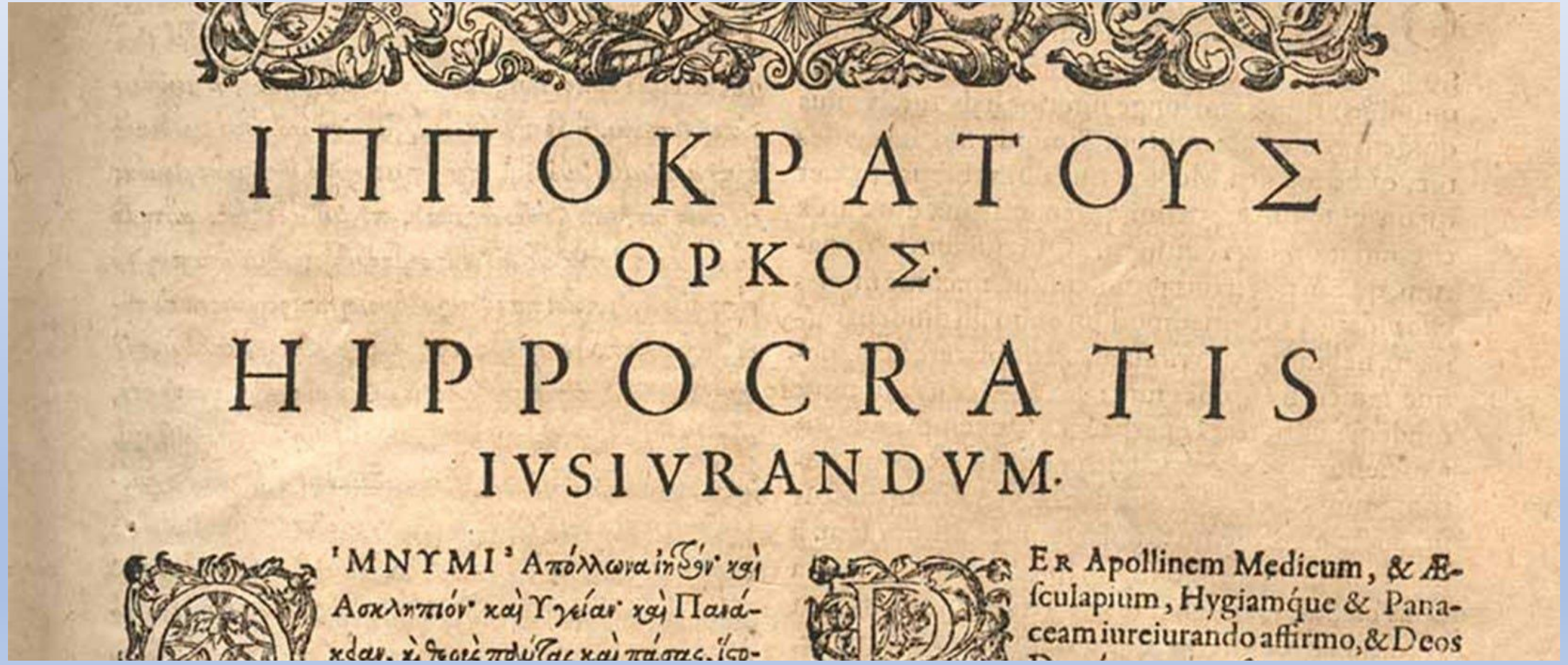
IMPORTANCE OF PATIENT SAFETY

- Radiology plays a pivotal role in diagnosis and treatment
- Safety issues can lead to harm, errors and adverse issues
- Patient safety is top priority in healthcare

The history of patient safety



ΙΠΠΟΚΡΑΤΟΥΣ

ΟΡΚΟΣ.

HIPPOCRATIS

IVSIVRANDVM.

'ΜΝΥΜΙ' Απόλλωνα ἰητρὸν καὶ Ασκληπιὸν καὶ Υγείαν καὶ Πανάκειαν καὶ θεοὺς πάντας ἵστ-

DEr Apollinem Medicum, & Æsculapium, Hygiamque & Panaceam iureiurando affirmo, & Deos


“Primum,
non nocere.”
– Hippocrates
(“First, do no harm.”)

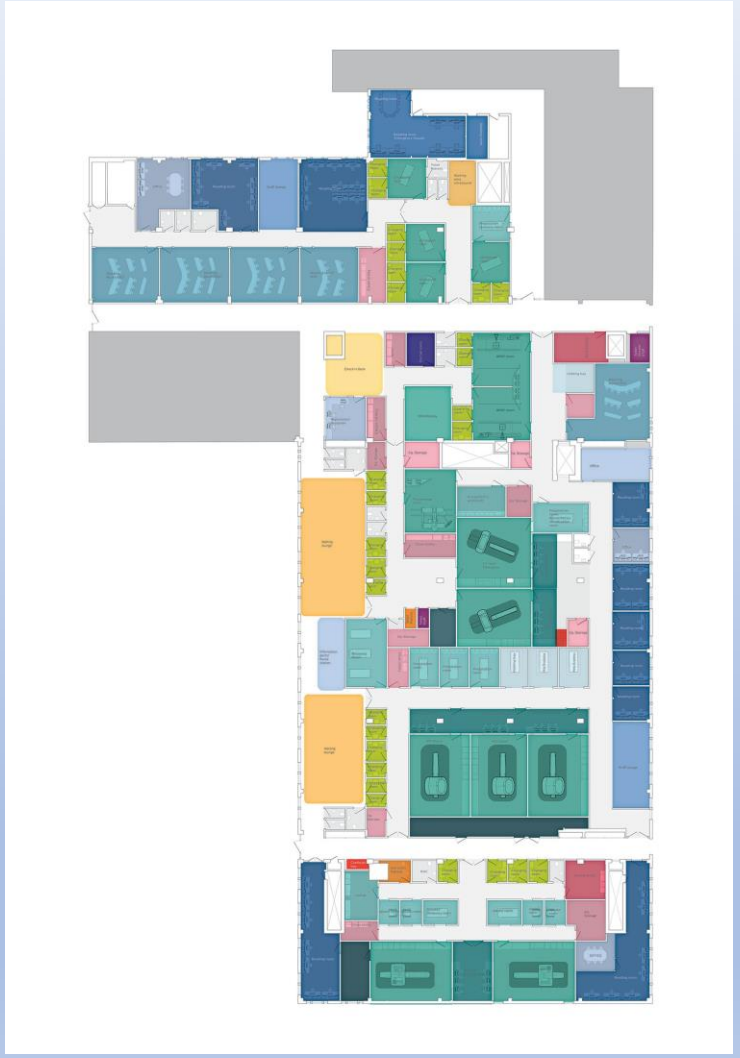
Radiology department functioning

To Ensure Safety in Radiology department – Variables are :

- **The Layout** & Infrastructure
- **The Human Factor** …….from the patient registration -> preparation -> waiting period -> Radiology study -> till the report delivery
- **The Machines** ……Radiation and Contrast hazards , technical Maintenance and Upgradation

Radio-Diagnosis Dept - Layout

- Registration & Layout approval – AERB
- Certification Display
- Structure keeps in mind one way transit to avoid crowding
- Construction keeping transit of all patients -- ambulant & assisted to move safely
- Structure keeps physical safety, radiation protection & infection control in cognizance



The Radiology department.

- The Layout & Infrastructure
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Patient identification and verification

- Accurate patient
- Correct study
- Correct part
- Correct side

- Maintaining patient privacy

- Identifying Any Risk Factors : Pregnancy / Age related issues

Effective Communication

- History
- Informed Consent
- Risk Factor assessment incl. Preg

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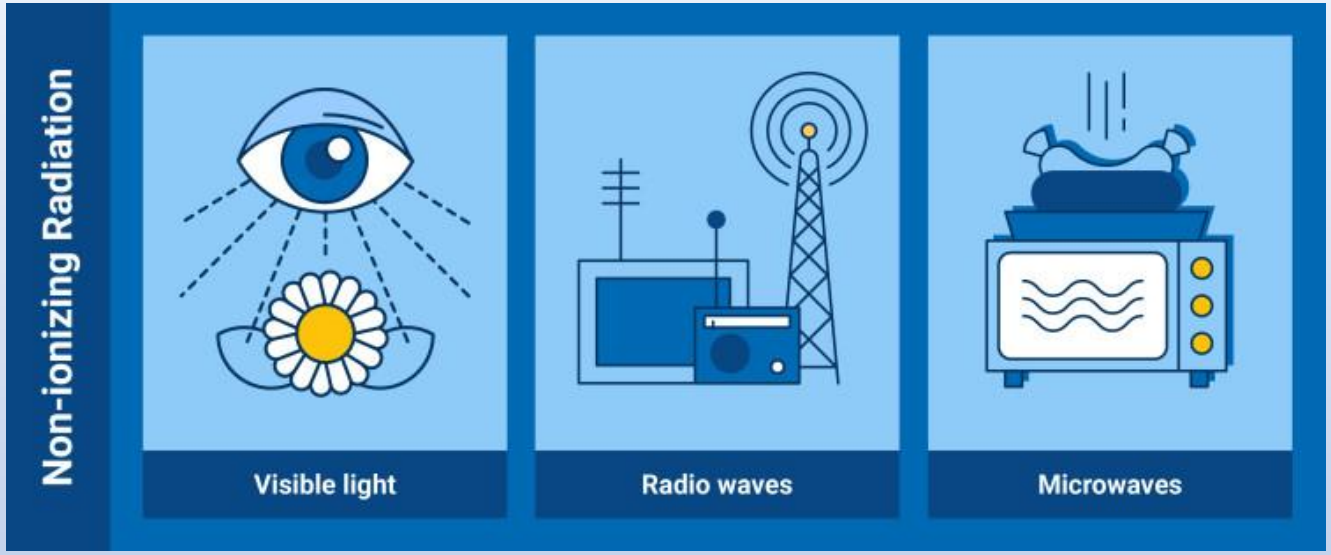
DO
NOT
ENTER
when
RED LIGHT
is on
CONTROLLED
AREA
RADIATION

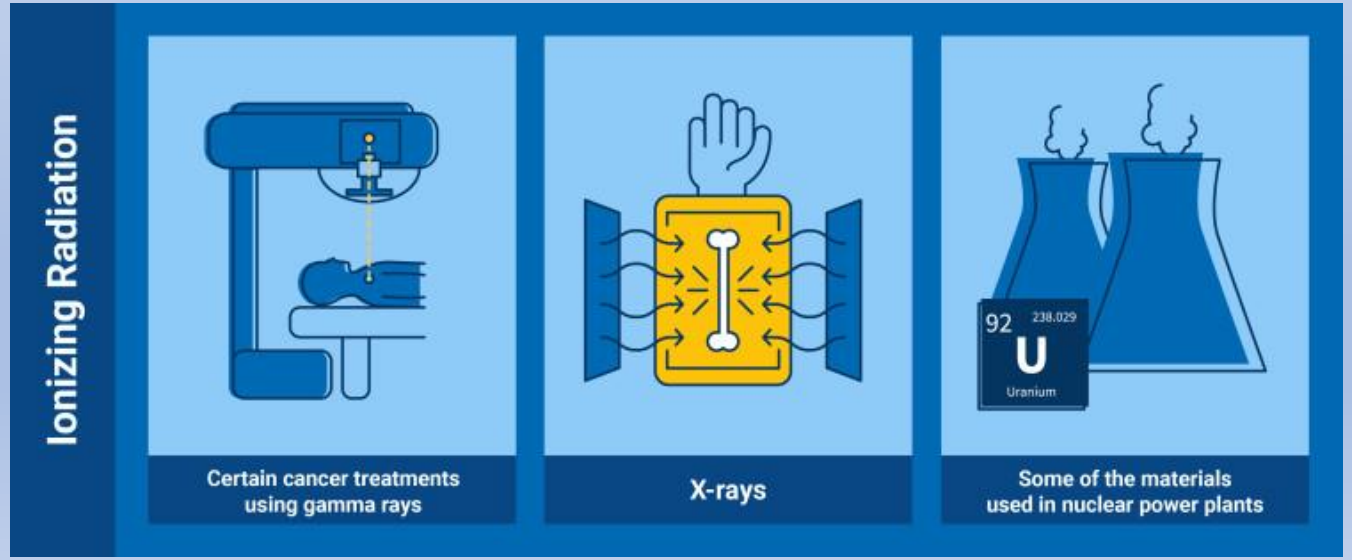

Radiation Hazard

Back to School……

What is radiation -

Radiation is energy that moves from one place to another in a form that can be described as waves or particles.

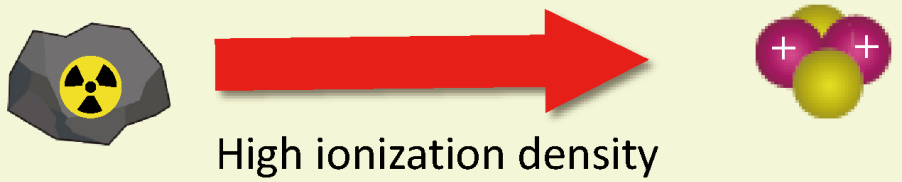




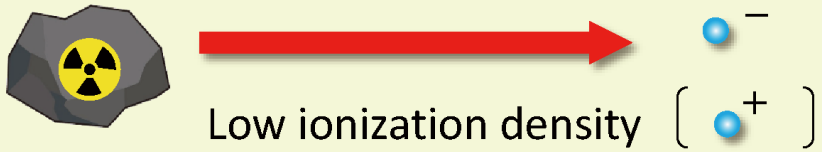
We are exposed to radiation in our everyday life.

Types of Radition & Bio Effects

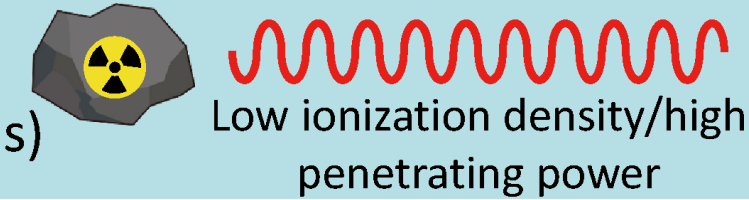
- **α-particles**
  - Two protons plus two neutrons
  - Helium (He) nuclei
  - Charged particles (2+)



- **β-particles**
  - Electrons (or positrons)
  - Charged particles (- or +)



- **γ-rays and X-rays**
  - Electromagnetic waves (photons)

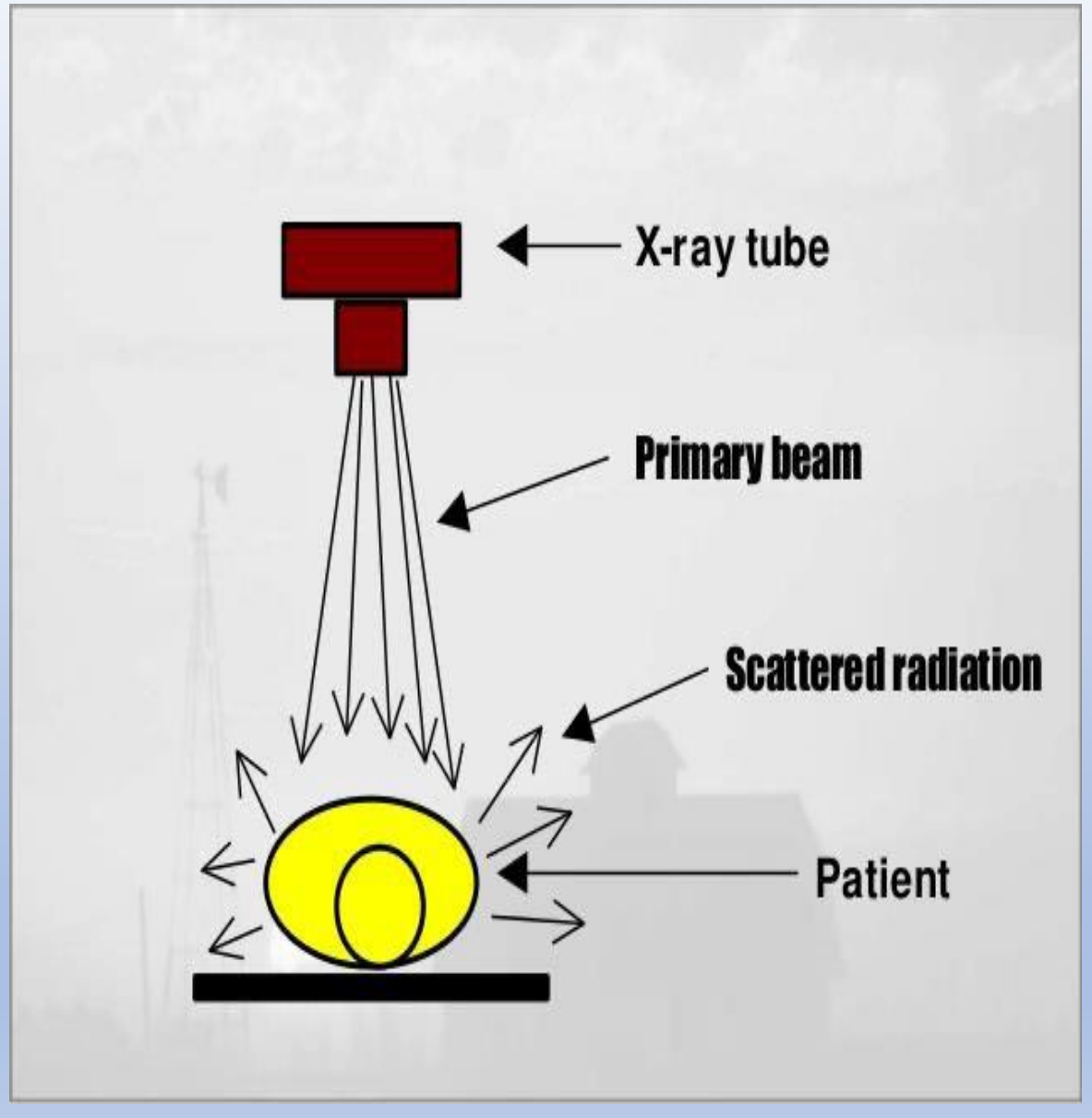


- **Neutron beams**
  - Neutrons
  - Uncharged particles

Ionization Density = > Bio Effects

Both Curies were constantly ill from radiation sickness
Marie Curie's death from aplastic anemia in 1934,
at age 66, was likely caused by radiation exposure

Her books & papers are still so radioactive that they are stored in lead boxes.



Types of Radiation

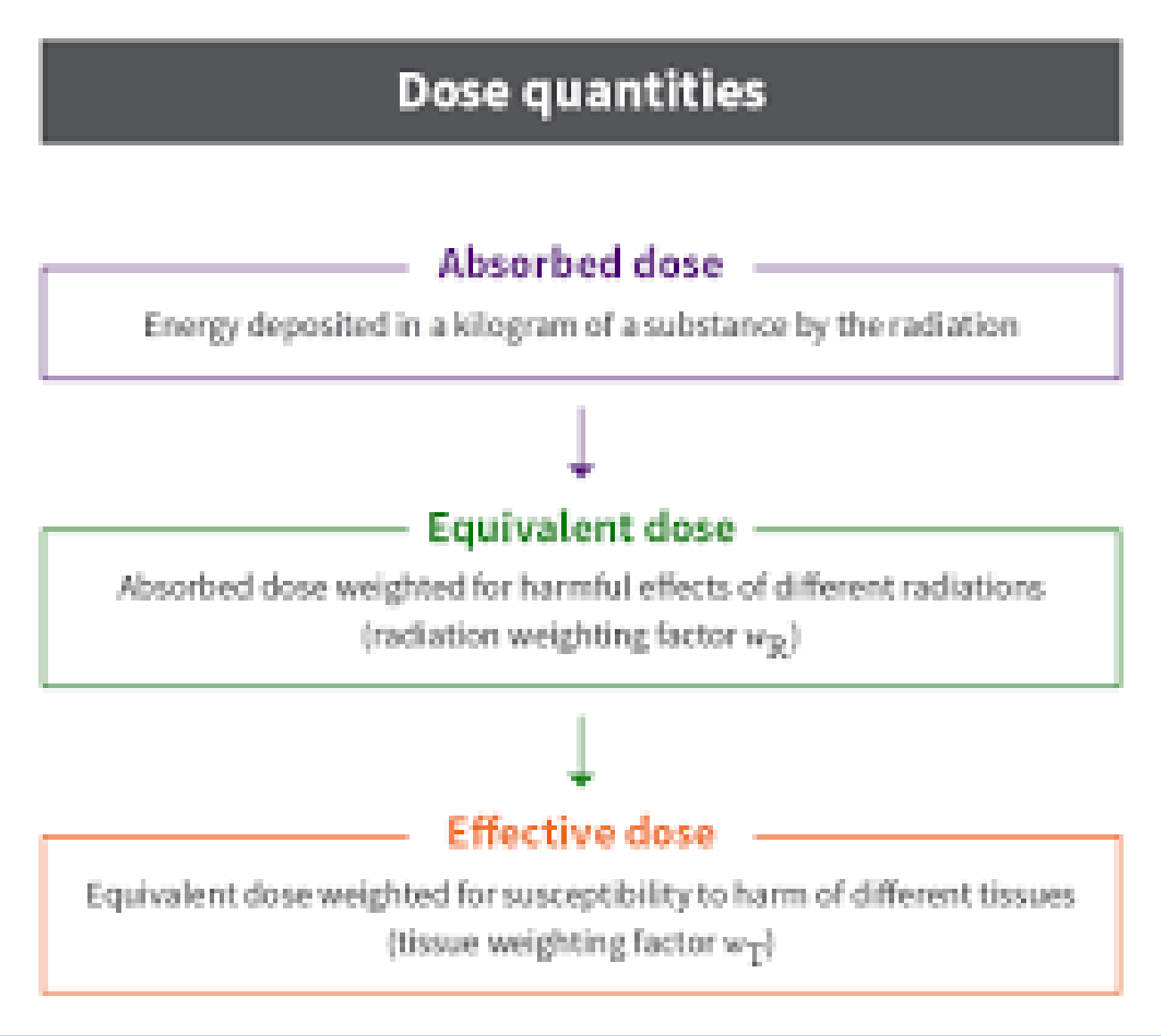
Primary Radiation: Primary radiation (also called as useful beam) is the radiation emitted directly from the x-ray tube that is used for patient imaging.

Primary Barrier: It is a wall, ceiling, floor or other structures that will intercept radiation emitted directly from the x-ray tube.

Secondary Radiation: Secondary radiation consists of x-rays scattered from the patient and other objects such as imaging hardware and leakage radiation from the protective housing of the x-ray tube.

Secondary Barrier: A secondary barrier is a wall, ceiling, floor or other structures that will intercept and attenuate leakage and scattered radiation emitted from patient and other objects

Radiation dose



Rad units

Quantity	S.I Units	Traditional Units
Exposure	Coulomb/Kg	Roentgen (R)
Absorbed dose	Gray (Gy)	Rad
Equivalent dose	Sievert (SV)	Rem
Effective dose	Sievert (SV)	Rem

Diagnostic Procedure	Typical Effective Dose (mSv)[1]	Number of Chest X rays (PA film) for Equivalent Effective Dose[2]	Time Period for Equivalent Effective Dose from Natural Background Radiation[3]
Chest x ray (PA film)	0.02	1	2.4 days
Skull x ray	0.1	5	12 days
Lumbar spine	1.5	75	182 days
I.V. urogram	3	150	1.0 year
Upper G.I. exam	6	300	2.0 years
Barium enema	8	400	2.7 years
CT head	2	100	243 days
CT abdomen	8	400	2.7 years

BIOLOGICAL EFFECTS OF RADIATION

Low Doses = DAMAGE GENETIC CODE
High Doses (>500mSv) = KILL CELLS
ACUTE RADIATION SYNDROME

- Radiation can cause
  - SOMATIC DAMAGE – Whole body rapidly dividing cells
  - GENETIC DAMAGE – Ova / Sperm – Cong. Abn / Stillbirths / Chr. changes

Damaged Genes dominant -> Next Generation
Damaged Genes recessive -> After few Gen's

  - CANCER -- >5 times

Hiroshima & Nagasaki - The Hibakusha journey

By the end of 1945, bombing killed approx. 1.4 L in Hiroshima, & 74 K in Nagasaki

Following years the survivors had leukemia, cancer etc

Devices for measuring radiation
a)Gieger Counter b) Scintillator c)Dosimeter

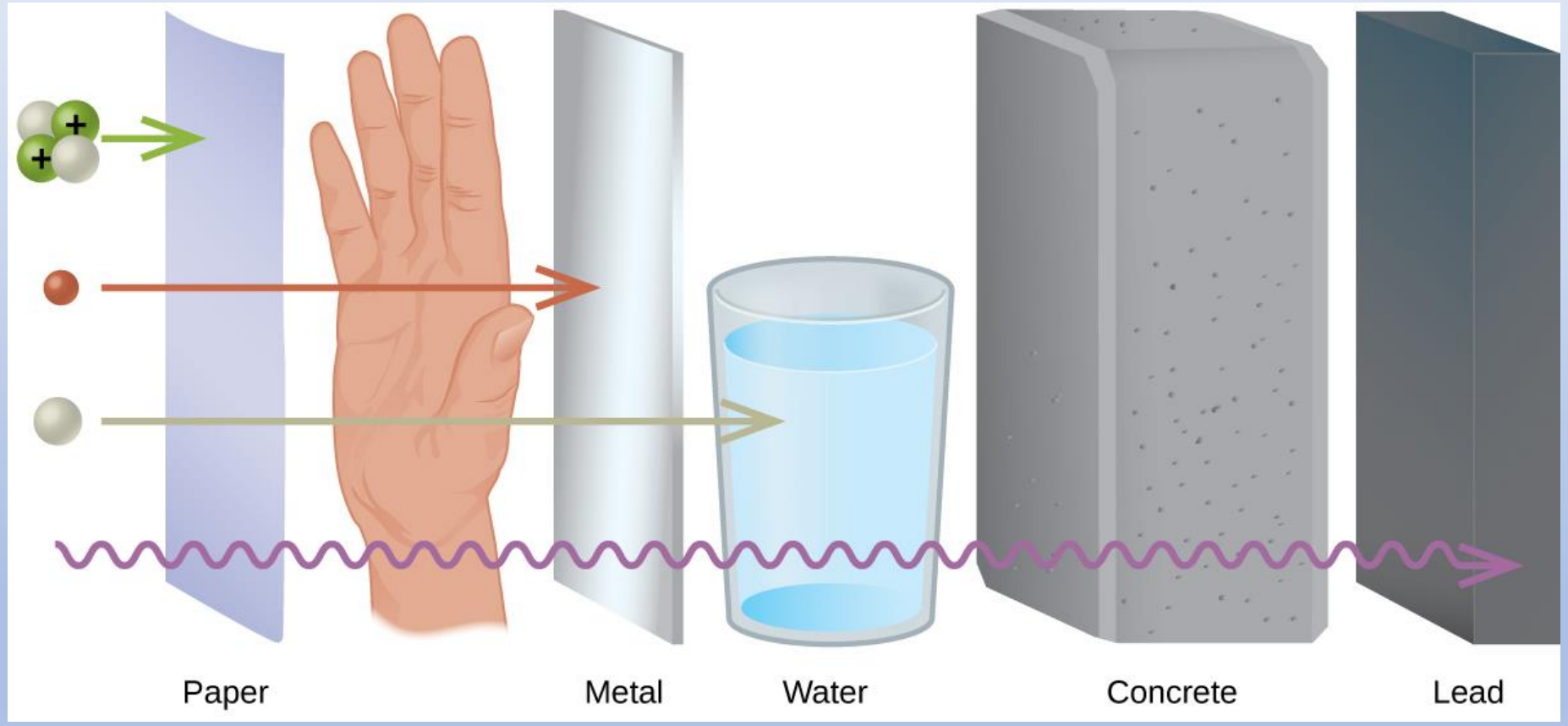
Radiation hazard prevention

Alpha

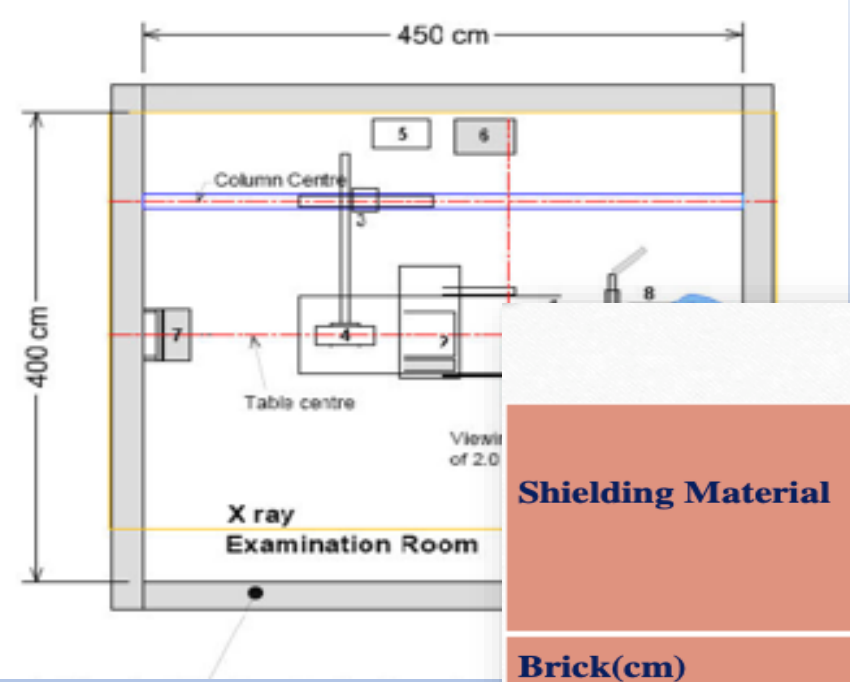
Beta

Neutron

Xrays / Gamma



RADIOLOGY DEPTT LAYOUT PLANNING



X-Ray Installation

Wall thickness of CT / X Ray room

Radiography and Fluoroscopy unit….

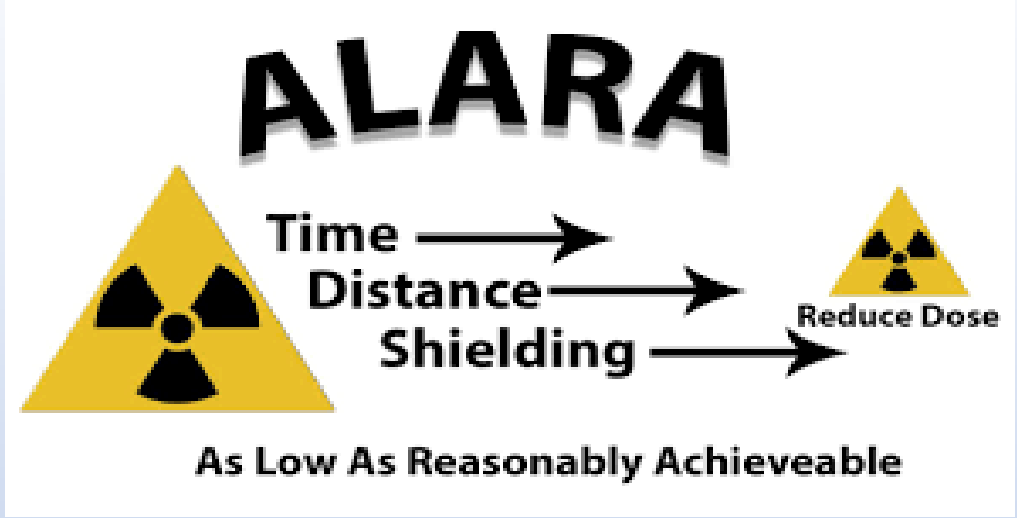
Shielding Material	Distance from centre of patient Table		
	1.5m	2.0m	Primary wall of dedicated chest x-ray installation at 2 m
Brick(cm)	23	20	20
Concrete (cm)	15	12	12
Steel(cm)	2.3	2.0	2.0
Lead(cm)	0.17	0.15	0.15
**Any other material	2.0TVT	1.8TVT	1.8TVT

Floor(if installation is not on ground floor) and ceiling thickness of 6-8 inch concrete is adequate.

** Note: Lead free shielding material have been developed by CSIR. These materials may also be used as radiation protection in medical diagnostic x-ray installation

Radiation safety

- USE ALTERNATIVE IMAGING MODALITIES WHEN POSSIBLE
- OPTIMIZE RADIATION DOSES
- ALARA :- AS LOW AS REASONABLY ACHIEVABLE



1. Time

- Reducing the time of exposure -> reduce radiation dose
- Dose rate is the rate at which the radiation is absorbed.
- Limiting the time of radiation exposure --> radiation dose.

2. Distance

- Increasing the distance between you & source you will **reduce exposure by the square of the distance**.
- Doubling the distance between your body & source will divide the radiation exposure by a factor of 4.

3. Shielding

- Lead apron, Neck Collars, lead glasses,
- Mobile lead shields, & lead barriers.

Use of protective lead aprons
&
their maintainence

TLD Badges


RADIATION
TLD
MONITOR
035302-0000
CONTROL
Apr-Jun 2016
KAYΔAN

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"Contrast Media"

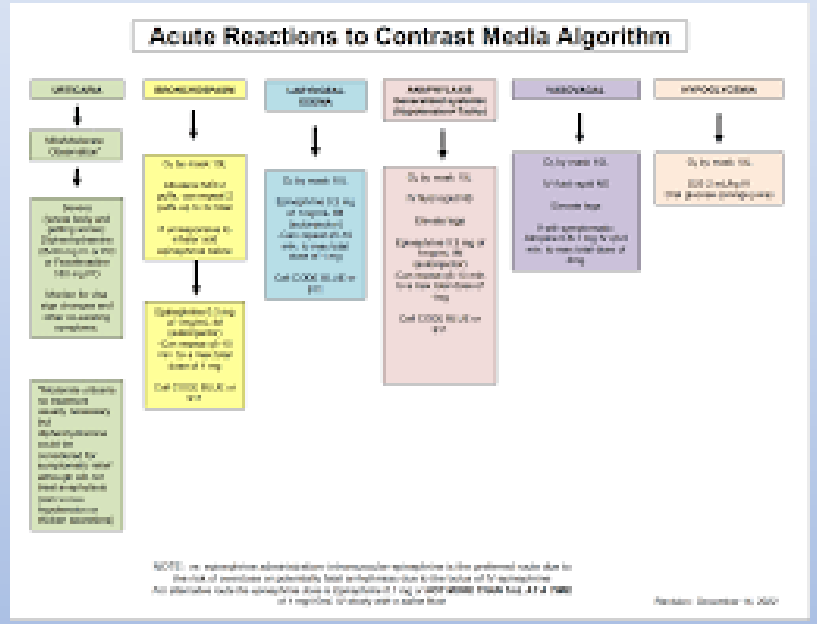
- substance placed in the body to provide added contrast when subject contrast is low
- increases the radiographic contrast between the area containing the CM & areas not containing CM

Without CM

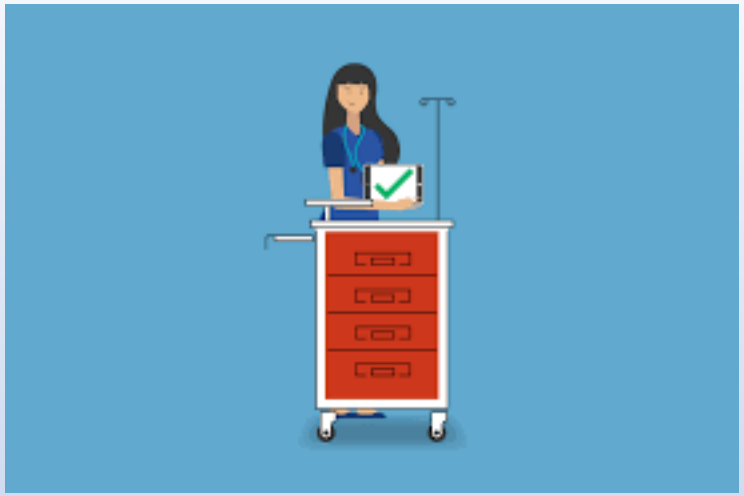
With CM

Adverse Reaction to Contrast Agents

- MILD
  - GI – N/V
  - CNS – headache / dizziness / anxiety
  - Resp – nasal stuffiness
  - Systemic – Itching / Rash / Chills /
- MODERATE
  - CVS – HT / Tachycardia
  - Resp -- Bronchospasm / Dyspnea
  - Gen -- Erythema
- SEVERE
  - CVS – Arrythmia / MI
  - CNS – Convulsions / Unresponsiveness
  - Resp – Laryngeal edema (progressive)



CRASH CART



- Adrenaline – For allergic reactions
- Atropine -anti-arythmatic
- Buscopan -For pain reliving
- Hydrocortisone -For allergic reactions
- Dopamine -to increase blood pressure
- Sodium bicarbonate -for electrolyte imbalance
- Diazepam -for sedation
- Avil – as anti- allergic agent

Equipment and quality assurance

- Regular checks and quality control
- Use of safety features like automatic exposure control
- Staff training and education
- Annual maintainence and Caliberation

Staff training and education

- Radiation Safety
- Infection Control & Prevention
- Patient safety
- Basic Life Support
- Quality Mx Systems

Patient monitoring and Support

- Monitoring patients during and after procedures after taking informed consent

- Providing support and care during adverse reactions

Fall Prevention

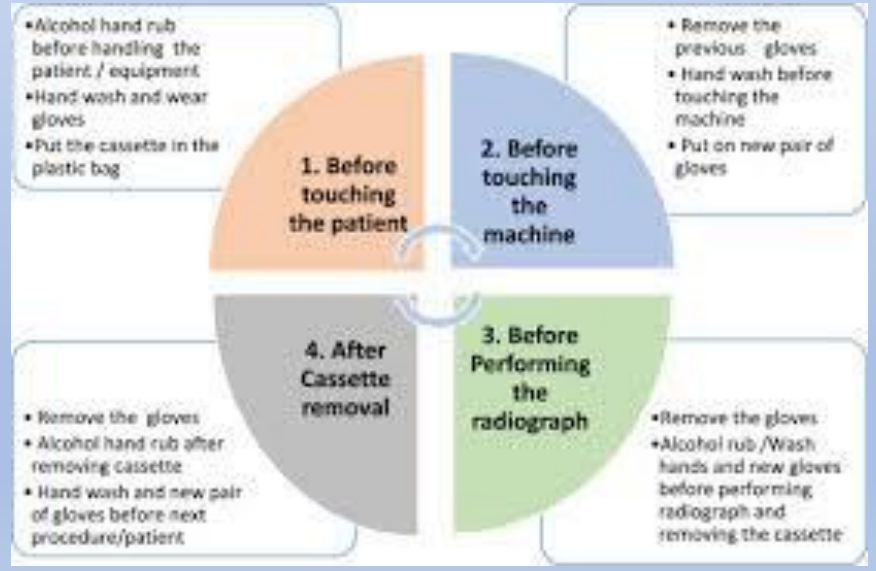
- Compatibility for Differently Abled / Unwell / Aged pt’s
- Skid Proof flooring
- Wheel Chairs / Stretchers / Grab bars

Fire Safety

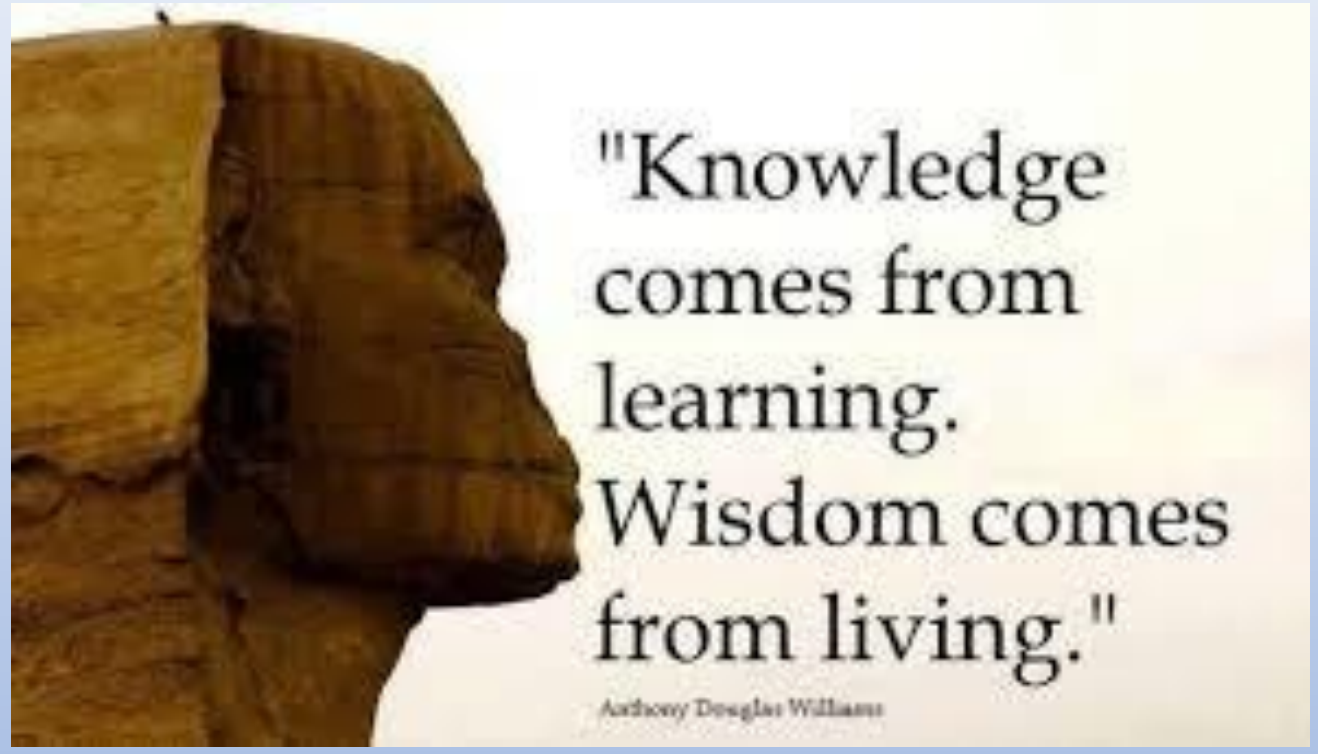
- Fire Exits
- Extinguishers
- Staff competence to operate devices

Infection Control

- Periodical Staff Check up / Immunization
- Hand Hygiene Protocols – Washing / Sanitizing
- P.P.E
- Decontamination of Equipment & Area
- Disinfection of Patient Care Area
- SOP for B.M.W. management




सावधानी
Hati
दुर्घटना
GhAti


"Knowledge comes from learning. Wisdom comes from living."
Anthony Douglas Williams

THANK YOU!