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## TO DESIGN AND IMPLEMENT APPROPRIATE PATIENT CENTERED INTERVENTIONS ALONG PS, HIC, NABH & BMWM PARAMETERS, SYSTEM DESIGN & ERGONOMICS SO AS TO DEVELOP A MODEL WARD IN A PRE-IDENTIFIED INDOOR UNIT OF A TERTIARY HEALTHCARE TEACHING INSTITUTE IN UTTAR PRADESH

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### ABSTRACT

**Background** - For the establishment of healthcare facilities, the most frequent model for bed wards is based on the type of medical condition. A bed ward is a basic organizational unit of stationary treatment in conventional healthcare that is used to improve patient outcome with certain medical disorders. Therefore, it needs the most quality care for the patient who leads to the need of the standardization of the facility and accreditations. The study was developed to increase the focus on accreditation and certification to support patient safety and high quality healthcare. **Aim** - To design and implement appropriate patient centered interventions along Patient Safety (PS), Hospital Infection Control (HIC), National Accreditation Board for Hospitals and Healthcare provider & Biomedical Waste Management (BMWM) parameters, system design & ergonomics so as to develop a model ward in a pre-identified indoor unit of a Tertiary Healthcare Teaching Institute in Uttar Pradesh. **Objectives** - To prepare & validate the appropriate toolkit for assessing PS, HIC, NABH & BMWM parameters, system design & ergonomics so as to develop a model ward in a pre-identified indoor unit of a Tertiary Healthcare Teaching Institute, To ascertain the situation of the designated ward to determine the gaps by analyzing the obtained data for the establishment of effective interventions, To prepare & implement appropriate interventions (if required) so as to prepare an evidence-based Modal ward on Key PS, HIC, BMWM & NABH parameters, system design & ergonomics for use in pre-identified indoor unit in an institutional setting. **Methodology**- An Observational & Descriptive study was conducted at Sanjay Gandhi Postgraduate Institute Medical Science (SGPGIMS), Lucknow. Study area was Neurosurgery ward (A & B). The study was conducted from September 2020 - May 2021. A customized validated toolkit (Structured Checklist) was used to measure all the elements.

Sl. No.	Parameters Assessed	Compliance Rate (%)		Partial Compliance Rate (%)		Non-Compliance Rate (%)	
		Ward A	Ward B	Ward A	Ward B	Ward A	Ward B
1.	HIC	37.93	36.78	35.63	35.63	26.43	27.58
2.	PS	18.18	18.18	18.18	09.09	63.63	72.72
3.	BMWM	20.83	25.00	41.66	33.33	37.50	41.66
4.	System design & Ergonomics of both wards	45.45		31.81		22.72	

**Keywords-** Ward, Quality care, Patient Safety (PS), Hospital Infection Control (HIC), National Accreditation Board for Hospitals and Healthcare provider & Biomedical Waste Management (BMWM)

## BACKGROUND

The healthcare scenario is rapidly changing around the world. People's need for healthcare and how it is delivered are influenced by economic, political, social, environmental, and cultural issues. The emphasis is on offering high-quality services at the lowest possible cost, resulting in a variety of non-hospital care options. Quality of care has long been recognized as a key factor in deciding whether or not a person seeks medical advice, follows through with treatment, and maintains a long-term connection with a practitioner. (Journal of AHA Vol. 12, No. 1)

In the establishment of healthcare facilities, the most frequent model for bed wards is based on the type of medical condition. A bed ward is a basic organizational unit of stationary treatment in conventional healthcare that is used to treat patients with certain medical disorders. The social and economic significance of the ergonomics of

technological aspects (buildings, furniture, and healthcare equipment) is well known. Poor quality has both quantitative and ineffable economic and moral implications (including physical suffering, mental strain, low work ethic, lack of subjectiveness, growing passiveness and pathy).<sup>(1)</sup>

As communicable diseases such as tuberculosis and multidrug-resistant organisms have gained public attention, the significance of infection control in facility design has become more prominent, affecting both consumer awareness and regulatory bodies responsible for environmental health and sanitation.<sup>(2)</sup>

Infection control in wards necessitates not only the use of sepsis and hygiene concepts, but also considerations of the ward's design, equipment, and ventilation. Hand washing is the single

most critical technique for preventing Hospital Acquired Infection. Biomedical waste is extremely harmful to both the public and the environment, which is why it requires special attention and management. The laws ensure that the general public is safe from contamination in any manner.<sup>(3)</sup>

The main objective of the study was there is increased International focus on ward design to improve patient outcomes, safety and quality of care which has led stakeholders, policy makers and healthcare provider organizations to adopt standardized processes for evaluating healthcare organizations. In our Institute, Accreditation and certification have been proposed as interventions to support patient safety and high quality healthcare. Guidelines recommend accreditation but are cautious about the evidence, judged as inconclusive. The push for accreditation continues despite sparse evidence to support its efficiency or effectiveness. The study includes that quality is an ongoing pursuit of excellence through continuous process and require the total commitment to the top management and involvement of all staff including Doctors and Nursing staff as there are involved directly in to the patient care. The standard laid down by National Accreditation Board for Hospitals and Healthcare Providers (NABH) is patient oriented and aimed at ensuring the desired quality level of patient care (outcome) through a high quality process of care which can only be ensured when

your staffs are well oriented towards these standards.

## METHODOLOGY

An Observational & Descriptive study was conducted at Sanjay Gandhi Postgraduate Institute Medical Science (SGPGIMS), Lucknow, one of the largest public sector tertiary care referral and teaching hospitals in India. Study area was Neurosurgery ward (A & B). The study was conducted from September 2020 - May 2021.

A customized validated toolkit (Structured Checklist) was used to measure all the elements as per the study objectives under pre-identified domains and sub-domains by reviewing International/National Guidelines for Patient Safety (PS), Hospital Infection Control (HIC), NABH & Biomedical Waste Management (BMWM). Direct observation was made along with the structured checklist in pre-identified areas w.r.t. PS, HIC, NABH & BMWM Parameters by photographs and videography to collect the evidence of real time practices for Hand hygiene, Sharp safety, Personal Protective Equipment, Respiratory hygiene/cough etiquettes, Environmental cleaning, Isolation precautions, Patient Identification, Nursing Handover, Medication Errors, Drug Administration, Surgical Safety Checklist, Segregation practices at the source of waste generation and Collection, Waste storage and transportation and Information,

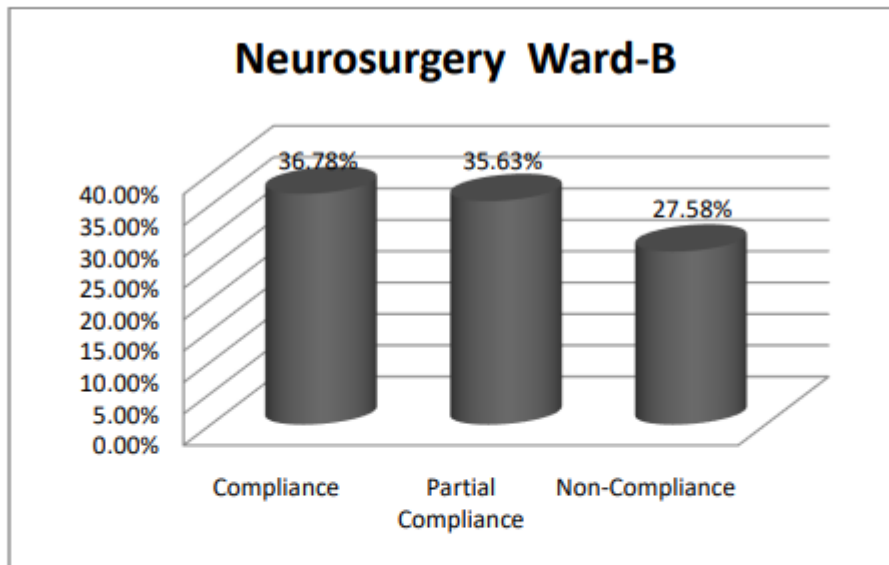
Education & Communication in pre-identified areas.

Based on the identification of deficit/s present in pre-identified areas were assessed along with the pre-designed tool the appropriate interventions were discussed and introduced with/through using National/International guidelines. The Broadway/s alone or in intervention/s that can be introduced in future are:

*Statistical analysis*

It was then statistically analyzed using MS-Excel Version 2007. Descriptive statistics based on the pre-identified areas w.r.t. PS, HIC, NABH & BMWM parameters were analyzed and the results are given as percentage.

**RESULTS**



**Figure 02**

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**Compliance rate of BMWM** - According to the observational checklist the compliance rate of Neurosurgery Ward- A & B (Figure 03 & 04) was 20.83% & 25.00%, partial compliance rate was 41.66% & 33.33% and non-compliance rate was 37.50% & 41.66%, respectively.

**Compliance rate of BMW -** According to the observational checklist the compliance rate of Neurosurgery Ward- A & B (Figure 03 & 04) was 20.83% & 25.00%, partial compliance rate was 41.66% & 33.33% and non-compliance rate was 37.50% & 41.66%, respectively.

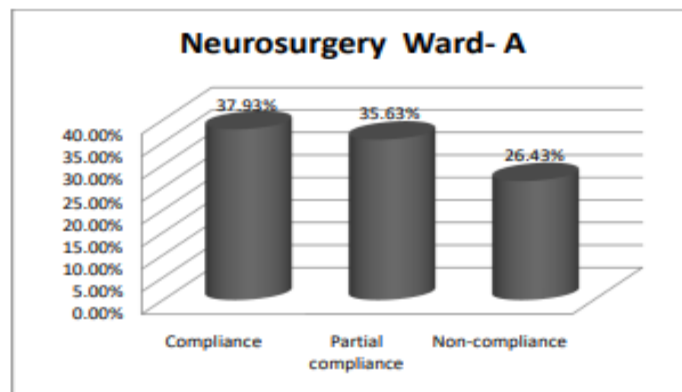


Figure 01

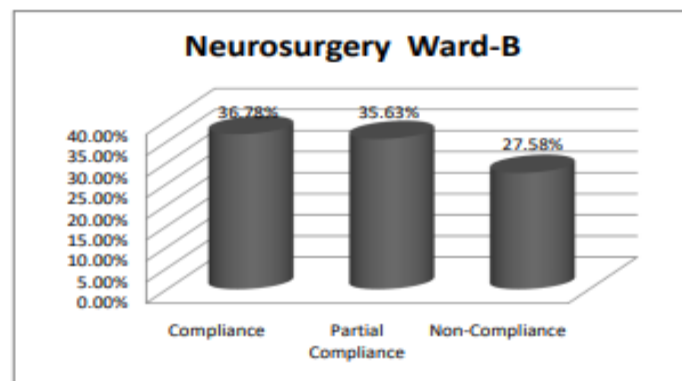


Figure 02

**Compliance rate of BMW -** According to the observational checklist the compliance rate of Neurosurgery Ward- A & B (Figure 03 & 04) was 20.83% & 25.00%, partial compliance rate was 41.66% & 33.33% and non-compliance rate was 37.50% & 41.66%, respectively.

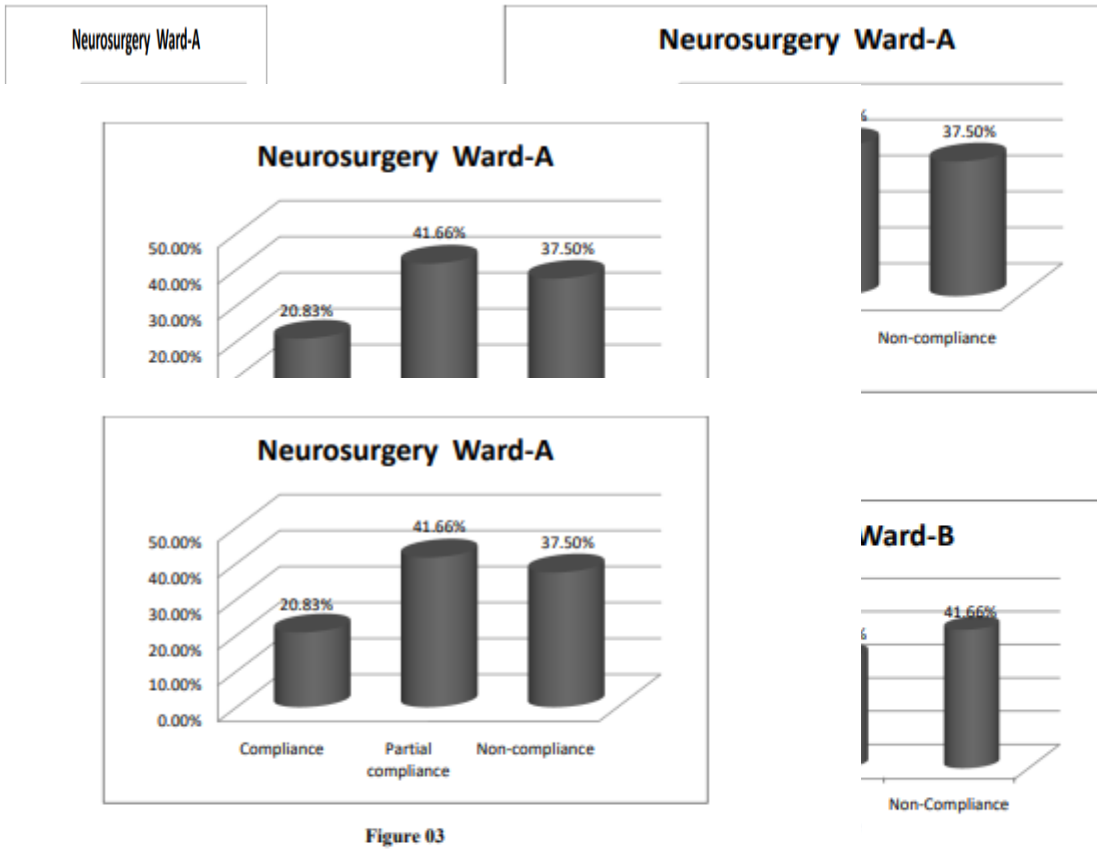


Figure 03

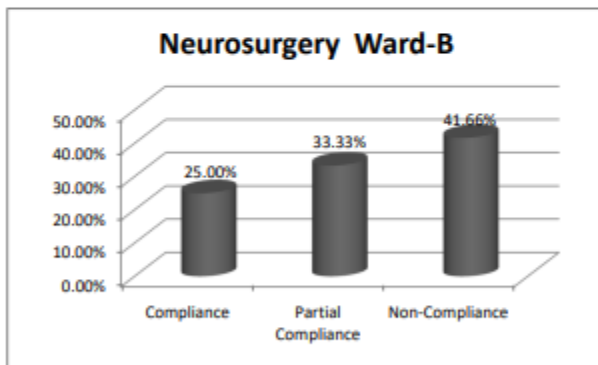


Figure 04

According to the observational checklist the compliance rate of Neurosurgery Ward- A & B (Figure 05 & 06) was 18.18% & 18.18%, partial compliance rate was 18.18% & 09.09% and non-compliance rate was 63.63% & 72.72%, respectively.

**Compliance rate of PS** - According to the observational checklist the compliance rate of Neurosurgery Ward- A & B (Figure 05 & 06) was 18.18% & 18.18%, partial compliance rate was 18.18% & 09.09% and non-compliance rate was 63.63% & 72.72%, respectively.

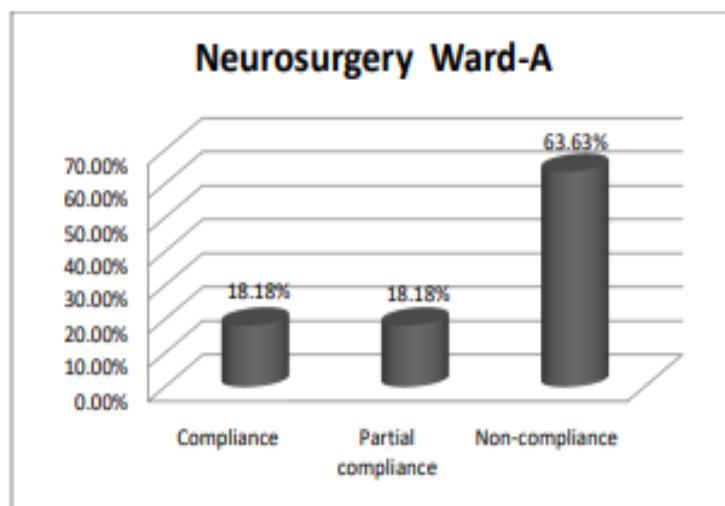


Figure 05

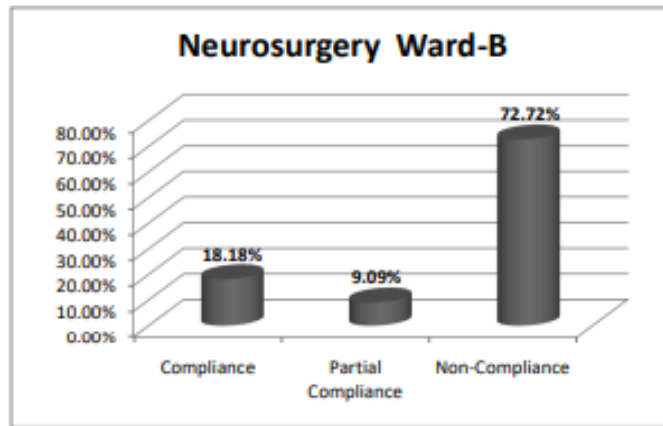


Figure 06

**Compliance rate of System design of both ward & Ergonomics** - According to the observational checklist the compliance rate of Neurosurgery Ward- A & B (Figure 07) combine was 45.45%, partial compliance rate was 31.81%, non-compliance rate was 22.72%, respectively.

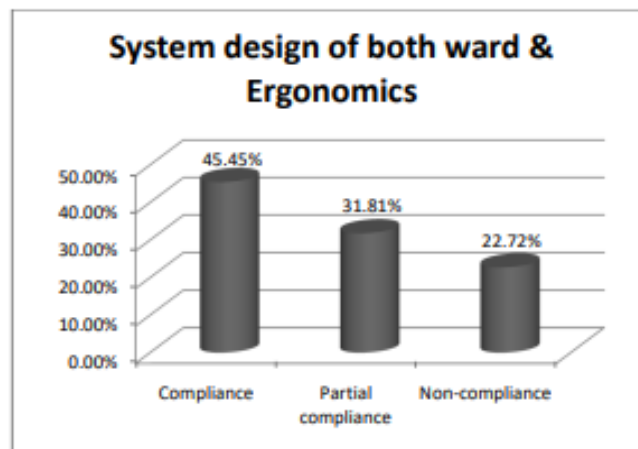


Figure 07

Based on the Observations for development of a model ward NABH guideline was preferred to fulfill the gaps of key parameters. According to the National/International guideline the appropriate interventions were implemented so as to prepare a model ward.



Adequate mixes of following interventions are being proposed (**Table No. 1**) to take forward as suggested by NABH guidelines:

**Table No. 1**

Sl. No.	Parameters
1.	<p><b>HIC</b></p> <ul style="list-style-type: none"> <li>- Policy- Needle Stick Injury - Posters for Hand Hygiene Practice (How to hand Rub, Steps &amp; Moments)               <ul style="list-style-type: none"> <li>• NSI Prophylaxis</li> <li>• Respiratory Hygiene</li> </ul> </li> <li>- Checklists               <ul style="list-style-type: none"> <li>• Daily Housekeeping • Pest Control Weekly</li> <li>• Housekeeping Checklist</li> </ul> </li> </ul>
2.	<p><b>BMWM</b></p> <ul style="list-style-type: none"> <li>- Standard Operating Procedures - Poster               <ul style="list-style-type: none"> <li>• BMWM Segregation Practice - BMWM bins procurement</li> </ul> </li> </ul>
3.	<p><b>Fire Safety</b></p> <ul style="list-style-type: none"> <li>- Poster               <ul style="list-style-type: none"> <li>• R.A.C.E &amp; P.A.S.S</li> <li>• Use of Fire Extinguishers - Fire Safety Checklist</li> </ul> </li> </ul>

- Teaching/training of the staff of ward:
- Focused group discussions
- Consensus building via Brainstorming
- Teaching cum training course of the mentioned parameters
- On site teaching/knowledge sharing

## DISCUSSION

A single ward shall be provided for the small inpatient primary care facility. Where renovation work is undertaken and the present capacity is more than one patient, maximum room capacity shall be no more than the present capacity, with a maximum of four patients. (4)

Fire safety is so important to all hospital administrators, staff, and architects, hospital executives should make every effort to stay up to date on current innovations in the sector. Each of these individuals' acts, no matter how insignificant, may have a significant impact on the hospital's overall fire safety environment.(5) Because hospitals are particularly vulnerable to dangers and accidents,

fire safety must be included from the start, in accordance with the National Building Code and other criteria. Controlling hazardous waste storage and the usage of hazardous gases or chemicals inside the hospital from a remote location.(6)

In this study, it was seen that compliance rate of system design of ward & ergonomics was 45.45%, partial compliance rate was 31.81% and non-compliance rate was 22.72%

## HIC

Based on the research, multi-model treatments appear to be the most effective technique for determining behavioral change that leads to improved hand hygiene compliance and lower HCAI rates. The use of alcohol-based hand massages and ongoing instructional initiatives are important factors in overcoming infrastructure constraints and improving knowledge.

In the present study, it was seen that compliance rate of HIC of ward was 37.93% & 36.78%, partial compliance rate was 35.63% & 35.63% and non-compliance rate was 26.43% & 27.58%. To make hand hygiene an institutional and priority for patient safety and to assure long-term sustainability of promotional program, healthcare administrators' support and commitment from national and local governments are required. Hand hygiene should be prioritized as a research area, with high-quality, randomized, controlled studies being conducted to assess its influence on HCAI and the relative effectiveness of the various components of multimodal treatments.(7)

## Patient Safety

Every year, an inexcusable number of individuals are injured or killed as a result of hazardous and low-quality medical care. The majority of these injuries are preventable. The extent and scope of the problem are highlighted by the burden of unsafe care.

In this study, it was seen that the compliance rate of PS of Ward was

18.18% & 18.18%, partial compliance rate was 18.18% & 09.09% and non-compliance rate was 63.63% & 72.72%.

### **BMWM**

In the present study, it was observed that compliance rate of BMWM of Ward was 20.83% & 25.00%, partial compliance rate was 41.66% & 33.33% and non-compliance rate was 37.50% & 41.66%

It was observed in a study, policies for bio medical waste and infection control was in only 50% of the large hospitals. Infection control and hospital waste management policies and committees are guiding forces for good practices in large and medium sized hospitals. It ensures establishment of effective and safe management of bio medical waste in the health care institution.

### **CONCLUSION**

In modern process of designing of the healthcare facility, main accent needs to be put on correct functional solutions, optimizing personnel's work conditions and providing visually attractive interiors, since it is related with a positive impact on the patient's process of recovery.

Infections continue to emerge in hospitalized patients, despite advances in public health and hospital treatment, and may also impact healthcare workers. The increasing variety of medical procedures and invasive techniques, as well as the environmental transmission of

drug-resistant bacteria among crowded hospital populations, where poor infection control practices may facilitate transmission, are all factors that promote infection among hospitalized patients.

Segregation of filthy and clean spaces, proper ventilation requirements, storage facilities, and the design of patient accommodation areas, including an acceptable number of hand wash basins and single bed facilities, is all important aspects of a successful hospital design. Ward unit design is an important area that all hospitals must address, and it necessitates a thorough examination of its structural requirements. In all care settings, provision for the following in building design reduces the risk of infection:

- Easy access to hand washing facilities
- Clean air
- Dry environment
- Ample space
- Minimal dust accumulation
- Easy cleaning
- Efficient waste removal (2)

Health-care safety is increasingly a major global problem. Services that are dangerous and of low quality result in poor health outcomes, if not outright injury. Although health systems differ from country to country, the experience of countries that are significantly involved in national efforts clearly reveals that many concerns to patient safety have similar roots and, in many cases, similar

responses. People should be treated and cared for in a safe environment, and they should be protected from health-care-related preventable harm, which requires concerted worldwide efforts.

The most important challenge in the field of patient safety must be how to prevent harm, particularly 'avoidable harm', to patients during treatment and care. All preventable errors can, and should be, avoided.<sup>(8)</sup>

A systematic training program for all representatives of medical institutions should be done on a regular basis, and BMMW authorities should be included in the training program. All wards should conduct awareness training camps, with all staff members required to attend. The formation of awareness regarding the segregation and disposal of biological waste should be included in the curriculum of all medical schools.<sup>(9)</sup>

The prevention of fire, particularly with respect to the combustibility of building and furnishing materials and the spread of fire and smoke, is a significant concern in the safety design for all facilities. Fire safety equipments must be readily available in the case of a fire, whether it is accidental or malicious. To avoid fear, health facility employees must have a working knowledge of how to use the equipment. Fire suppression is vital in order to avoid/minimize property and life loss and damage. The capacity to identify and extinguish flames rapidly is critical in avoiding the

worst-case situation of evacuation. It includes:

- Fire Alarm System
- Smoke and Heat Detectors □ Fire Extinguishers
- Water Sprinkler System □ Water Hose Reels<sup>(10)</sup>

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