Manage TB
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Lecture – 58
Airborne Infection Control in Tuberculosis Session 01

Good morning. I am Doctor B. N. Sharath faculty from ESIC medical college and PGIMSR Bangalore, Karnataka. I will be talking on Infection Control in Tuberculosis which is based on the guidelines of airborne infection control for healthcare settings from central TB division.

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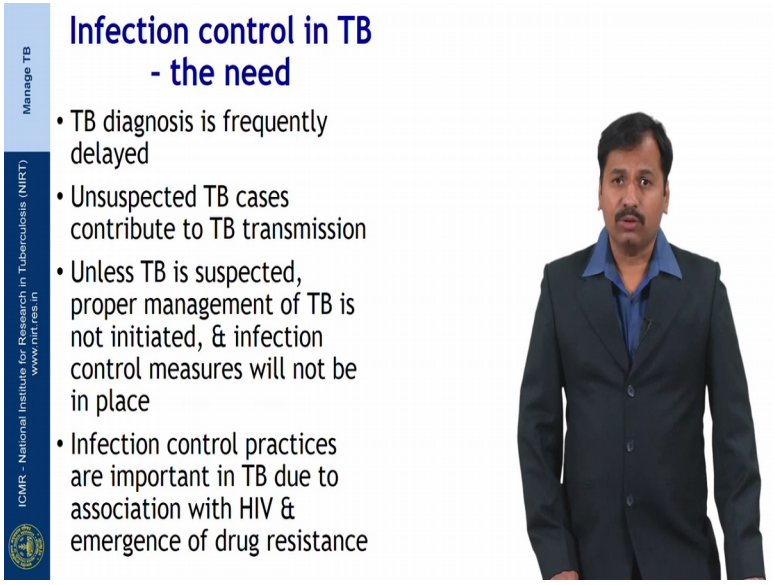

Infection control; why do we need infection control? Basically we know TB diagnosis is frequently delayed and unsuspected TB cases contribute a lot for TB transmission and unless you suspect a TB case, initiate them on treatment infection control measures will not be in place and infection control practices are very important in TB due to its close association with HIV and drug resistance tuberculosis.

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In this session I will be talking about administrative control, environmental control, higher settings and health worker safety and patient counseling and household precautions.

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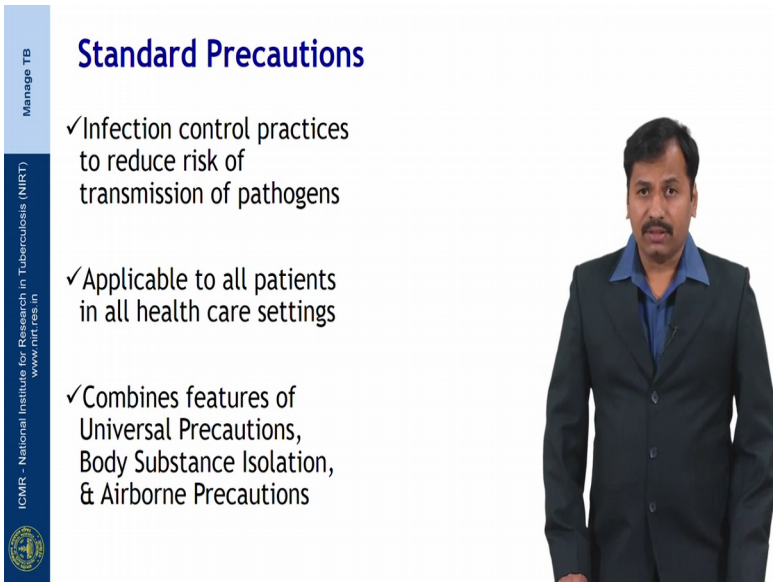

Standard precautions; for any control of infections the infection control practices is to reduce the risk of transmission of pathogens applicable. It is applicable to all healthcare settings it combines the features of universal precautions, body surface isolation and airborne precautions.

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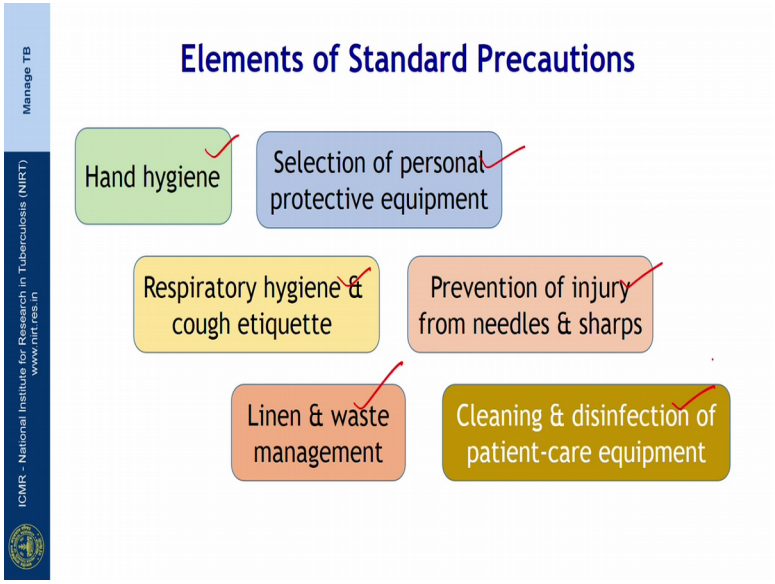

The elements of standard precautions includes; hand hygiene, selection of personal protective equipment especially for the healthcare workers and the patient to reduce the source of infection and educating the patients with respiratory hygiene and cough etiquette.

Prevention of injury from needles and sharps for the health care workers and disposal of infectious material which are accumulated in linen and waste management and cleaning and disinfection of patient care equipment frequently. These are the elements of standard precautions hierarchy of infection control any hierarchy I mean in any infection control the hierarchy is the first one is the administrative control the second is environment control and the third is personal protective equipment.

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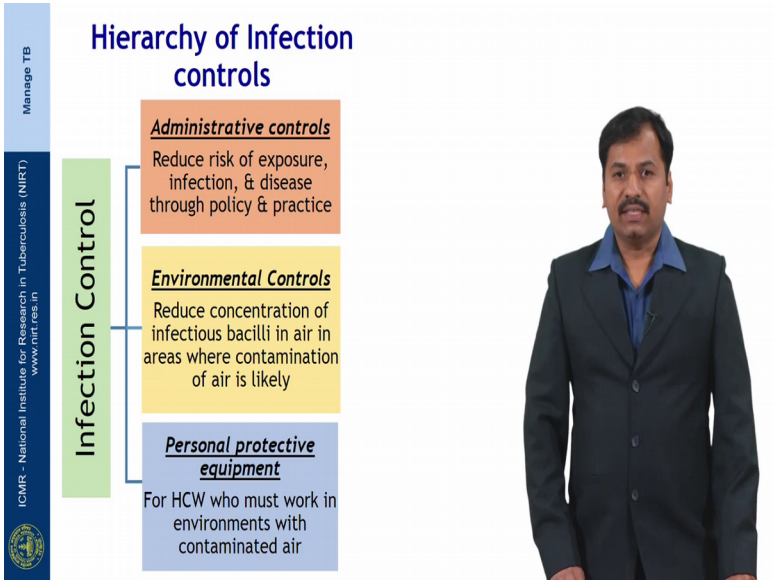

In administrative control the aim is to reduce the risk of exposure among the patients and the healthcare workers.

Through proper policy and practice environmental controls it helps in reducing the concentration of the infectious bacilli in air in areas where contamination of air is likely to happen. Personal protective equipment for healthcare workers who work in such a contaminated area they are to be protected for that we use personal protective equipment.

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Coming to administrative controls the first thing the administrative con in the measure of in administrative control is to identify the person with respiratory symptoms, separate them into appropriate environment, first track them through the health care facility to reduce exposure time to others, diagnose and treat them with minimal delay, hospitalization should be reduced or avoided to the greatest extent possible for this kind of patients.

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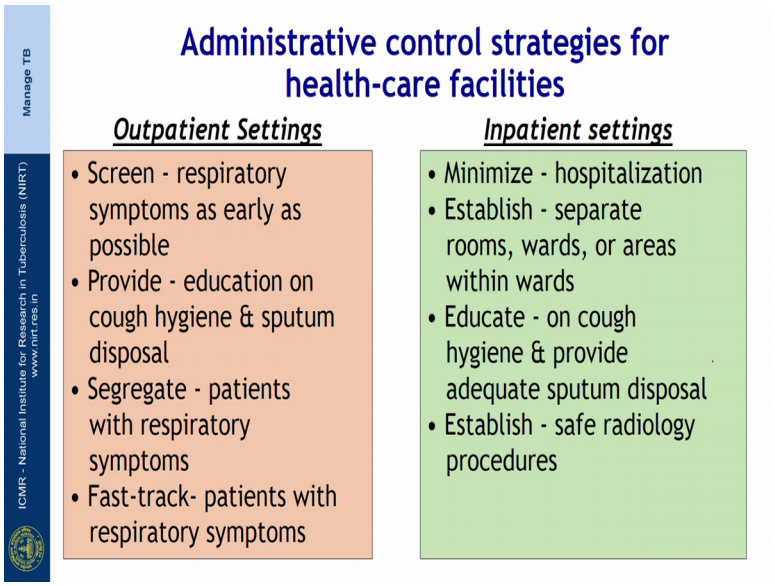

Administrative control strategies for health care facilities; we have two stress two strategies one is for outpatient settings the other is for inpatient settings. In outpatient settings the first thing what we do is screen respiratory symptoms as early as possible, provide education on cough hygiene and sputum disposal at the place where the patient is there.

Segregate patients with respiratory symptoms as soon as possible and try to fast track these patients with respiratory symptoms for early diagnosis. Coming to the inpatient settings minimize hospitalization as for as possible and establish separate rooms or wards or area within wards for this highly infectious infectious diseases. Educate the patient in wards on cough hygiene and provide adequate sputum disposal facilities for the patients. Establish safe radiology processes.

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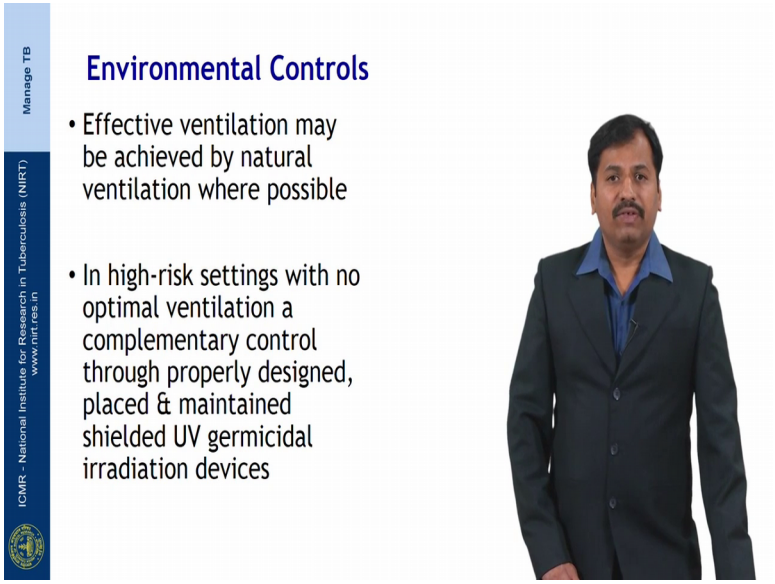

And coming to the environmental controls one important thing or one basic thing what we all need to know is the natural ventilation; effective ventilation may be achieved by natural ventilation wherever possible.

In high risk settings with no optimal ventilation a complimentary controlled through properly designed placed and maintained shielded UV germicidal irradiation devices can be used.

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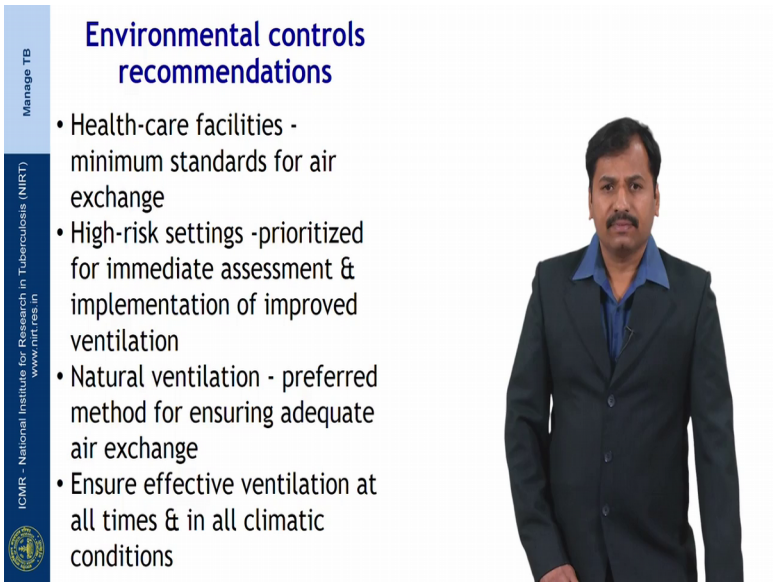

And the recommendations for these environmental controls are in health care facility there should be a minimum standard for air exchange. High and high risk settings prioritized for immediate assessment and implementation of improved ventilation that the places, wherever there are high risk settings the area should be evaluated assessed and proper ventilation has to be in place. Natural ventilation; it is the preferred method for ensuring adequate air exchange. Ensure effective ventilation at all times and in all climatic conditions.

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In the absence of natural ventilation what we can do is; we should have a well designed maintained and operated mechanical ventilation in place or in high risk settings where it is not possible try to use the upper rooms or try to use shielded UV germicidal irradiation devices.

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One important aspect which can be easily done is optimal arrangement of patients and staff in all outpatient departments, directly observed treatment centers, microscopy centers and radiology departments. The directional control of air flow recommended in specific high risk settings, that is airborne precaution rooms or MDR-TB wards and clinics and bronchoscopy suits.

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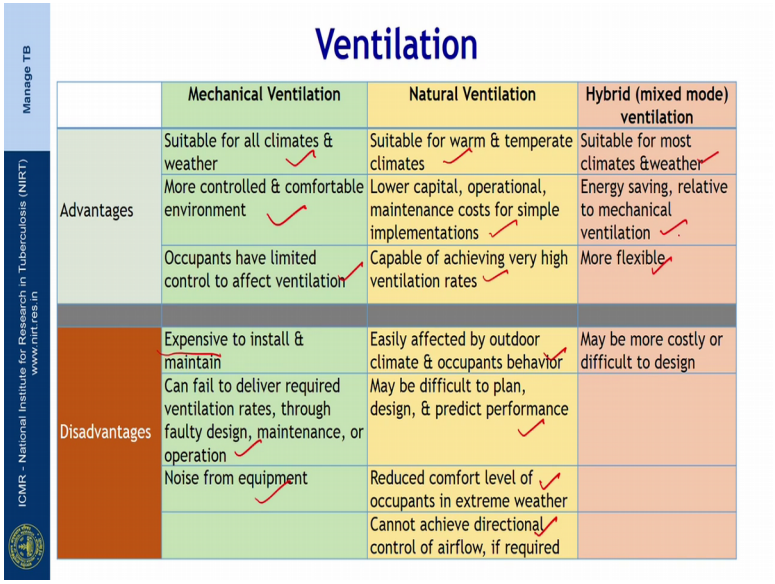

	Mechanical Ventilation	Natural Ventilation	Hybrid (mixed mode) ventilation
Advantages	Suitable for all climates & weather	Suitable for warm & temperate climates	Suitable for most climates &weather
	More controlled & comfortable environment	Lower capital, operational, maintenance costs for simple implementations	Energy saving, relative to mechanical ventilation
	Occupants have limited control to affect ventilation	Capable of achieving very high ventilation rates	More flexible
Disadvantages	Expensive to install & maintain	Easily affected by outdoor climate & occupants behavior	May be more costly or difficult to design
	Can fail to deliver required ventilation rates, through faulty design, maintenance, or operation	May be difficult to plan, design, & predict performance	
	Noise from equipment	Reduced comfort level of occupants in extreme weather	
		Cannot achieve directional control of airflow, if required	

Among the ventilation we have three types of ventilation which we use; one is mechanical ventilation, natural ventilation and a hybrid or a mixed mode ventilation.

But each of this has certain advantages and certain disadvantages. Talking about mechanical and ventilation the advantages it is suitable for all climates and weathers and it is more controlled and comfort I mean and controlled a comfort environment. Occupants have limited control to affect ventilation, but the dis disadvantages are it is very expensive to install and maintain, it can fail to deliver a required ventilation rates through faulty design maintenance or operations and there will be a some kind of noise from the equipment.

Natural ventilation it is suitable for warm and temperate climates, it requires lower capital, no operational issues, maintenance cost for simple implementations, it is capable of achieving very high ventilation rates, but the disadvantages are easily it is easily affected by outdoor climate and occupants behavior, it might be difficult to plan design and predict the performance, reduced comfort level of occupants in extreme weather cannot achieve directional control of air flow if required.

We have a combination of both that is mixed mode ventilation or hybrid ventilation which is suitable for most climates and weathers it is energy saving relative to mechanical ventilation and more flexible, but the disadvantages is it may be more costly or difficult to design.

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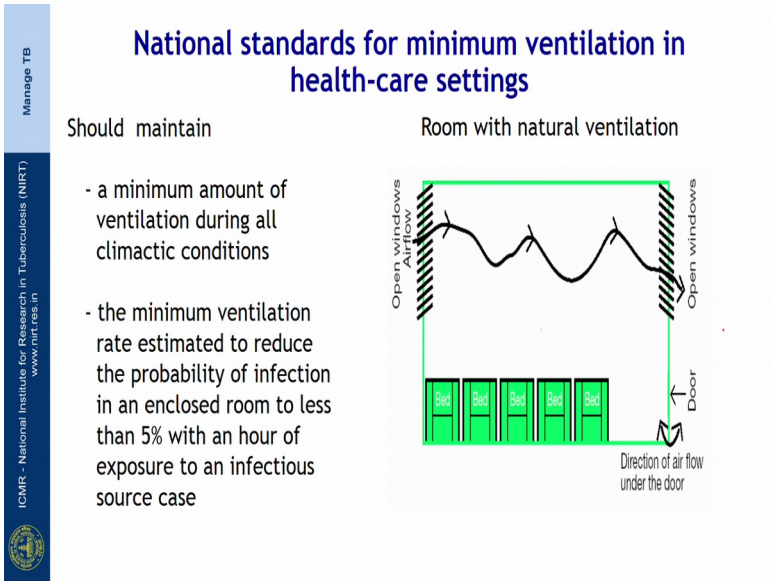

National standards for minimum ventilation in healthcare settings any healthcare setting should maintain a minimum amount of ventilation during all climatic conditions. The

minimum ventilation rate estimated to reduce the probability of infection in an enclosed room to less than 5 percent with an hour of exposure to an infectious source case.

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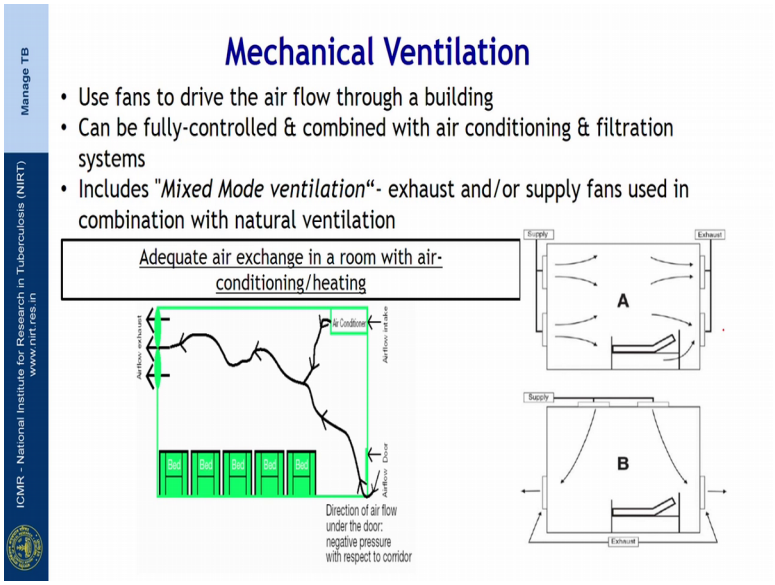

Mechanical ventilation; we usually use fans to drive the airflow through a building and these fans can be fully controlled and combined with air conditioning and filtration systems as I said earlier it includes mixed mode ventilation exhaust and our supply fans used in combination with natural ventilation.

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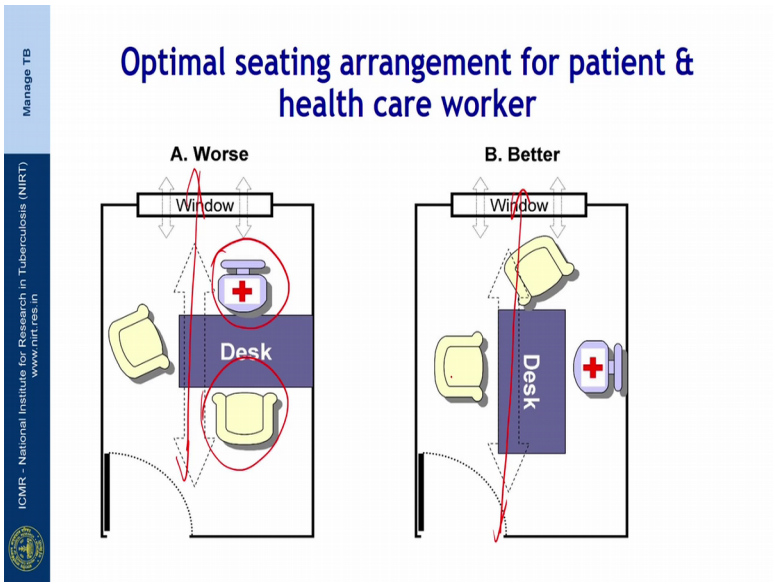

In this figure we can see the optimal seating arrangement for patient and healthcare worker. In figure A what you can see is you have a window and a doctor is sitting just in front of the window whereas, the patient is also a sitting in front of the window, but the airflow is in this direction there is all possibility that the healthcare worker may get infected with the infectious materials of the patient. So, the best way that is the figure B which show is you have to place the doctor and the patient in such a way that a stream of air separates them; this is the window and this is the stream of air which separates the doctor or the healthcare worker and the patient.

So, in this session have talked about the administrative control and environmental control, in this session I talked about the administrative control measures and the environmental control measures that are key for control of infection control in healthcare settings. I will be ending this session now in the next session I will be talking about infection control in higher settings households and for healthcare workers.