Brief overview of ETTi satellite session on Airborne IPC in the framework of the 7th SA TB Conference in Durban, 13 September 2022

During the airborne IPC workshop, lectures were followed by practical exercises.

Presentations	**Presenter**
Overcoming barries and obstacles to sustainable implementation of infection prevention and control program	Dr Lindiwe Mvusi
Effective and affordable environmental controls (Ventilation & UVGI)	Toby van Reenen
Patient flow & building design	Jako Nice
Making a personal respiratory protection programme feasible	Dr Grigory Volchenkov
Practical exercises	**Presenter**
Upper-room UVGI: measurement and maintenance	Toby van Reenen
Respiratory protection and qualitative respirator fit testing	Dr Grigory Volchenkov
Biosafety cabinets	Gregers Chalker
Patient flow & building design	Jako Nice
Optimizing patient flow in health care facilities	Dr Matsie Mphahlele

1.Practical exercise: Upper-room UVGI: measurement and maintenance

Lecturer: Toby van Reenen, Snr Researcher, CSIR, Pretoria, South Africa

Goals of the practical exercise:

- to demonstrate UVGI system design considerations and complexities;
- to demonstrate practicalities of UVGI maintenance.

Outline:

1. Demonstration of device maintenance and cleaning:

Equipment:

- PPE for eye safety
- Lint free cloth

- Water / 70% Alcohol Gloves for cleaning

UVGI devices need maintenance interventions every three months. These interventions include cleaning, measuring and monitoring the key features, otherwise, their performance degrades very quickly over time. UVGI devices are very sensitive to dust and dirt.

- Turn off your device;
- disassemble louvres and vacuum, wipe internals and a lamp with a lint free cloth;
- reassemble and measure 1m max irradiance with a UV-C meter.
- Compare with 70% of the declared irradiance (SANS 1760:2016 – South African National Standard)

Remember that one of the major concerns of UV overexposure is eye irritation. Use PPE for eye safety. UV penetration through human skin it quite low.

2. Calculation of the number of devices needed for a given room to get an effective dose (according to SANS 1760:2016 – South African National Standard):

- review Space Risk Assessment;
- measure room dimensions (size and shape including height limits), Volume = 750 m^3;
- discuss existing ventilation and air mixing requirements;
- describe dosing requirements (14 mW/m^3);
- discuss requirement for device performance data (500 mW, SANS 1760 data sheets);
- determine a number of devices and their locations.

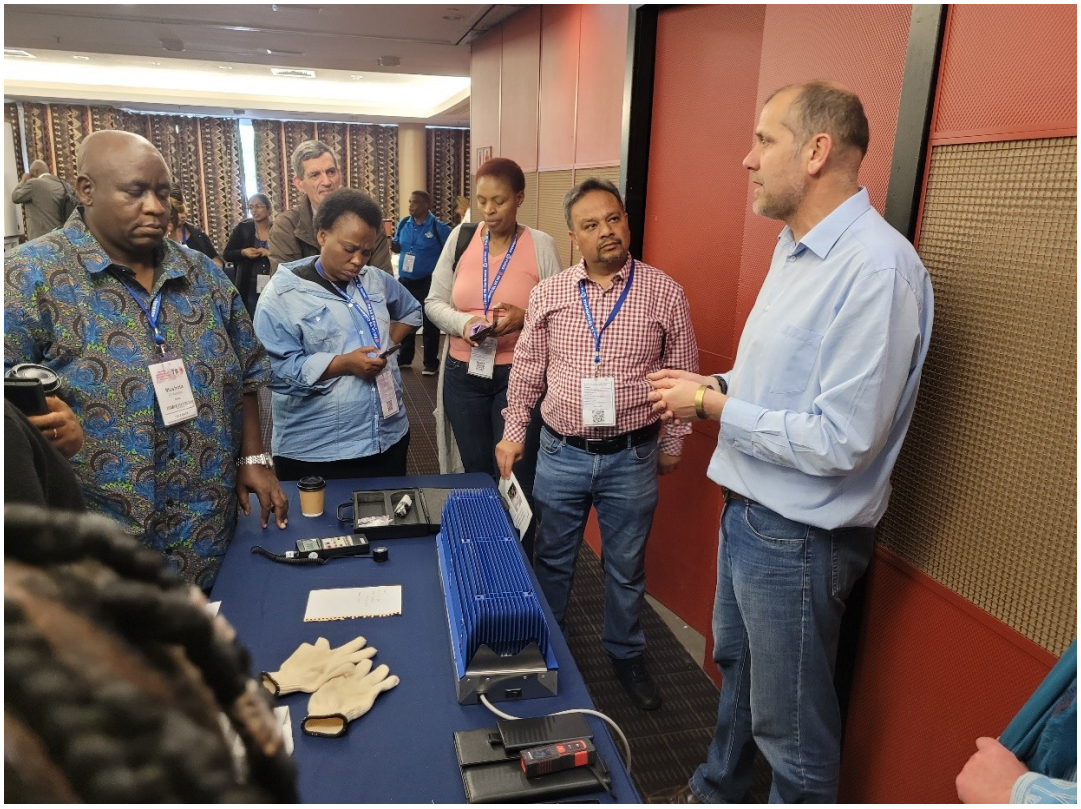
$$Numberofdevices_{\phi} = \frac{14 \times V_r}{\phi_T}$$

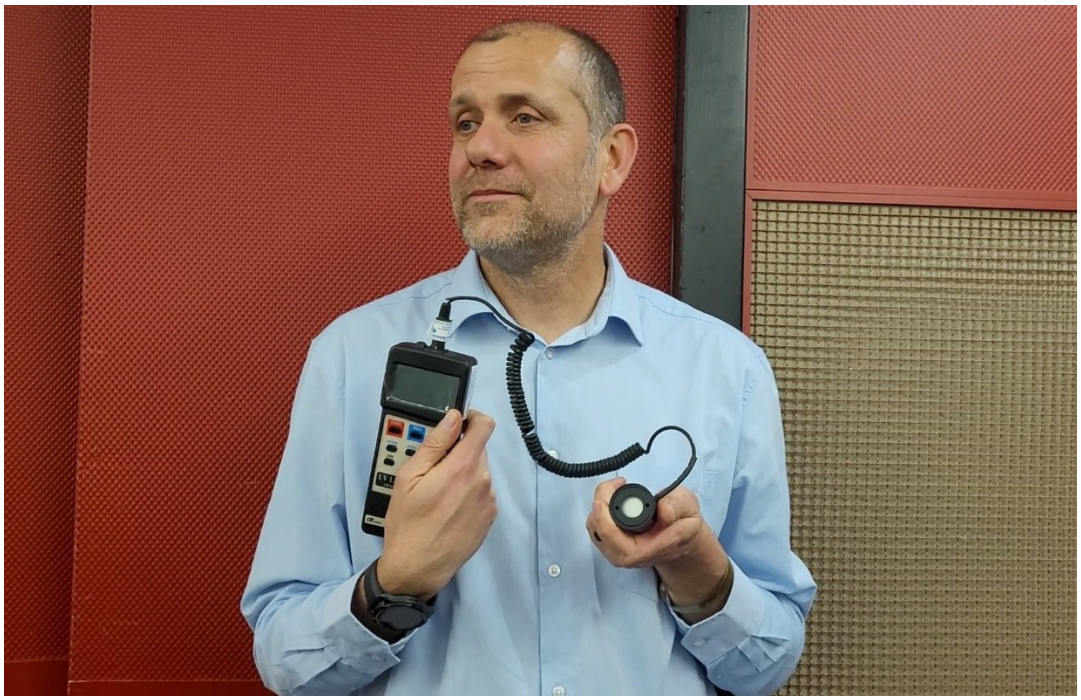
= (14 *750)/500 = 20 =˃ 20 devices along two walls only,
ceiling height too low for safety

3. Discussion of investment case for UVGI in resource constrained settings from both patient and staff protection perspectives.

<u>Key message:</u>

- UVGI maintenance is significantly more onerous that commonly understood;
- proper system design is relatively complex and requires a competent professional;
- most UVGI systems not installed to code will be either ineffective or dangerous (which is even worse).





You can watch a short video with a practical exercise here.

2. Practical exercise: Respiratory protection and qualitative respirator fit testing

Lecturer: Dr. Grigory Volchenkov, Chief doctor, Vladimir Regional TB Center, Russian Federation

Goals of the practical exercise:

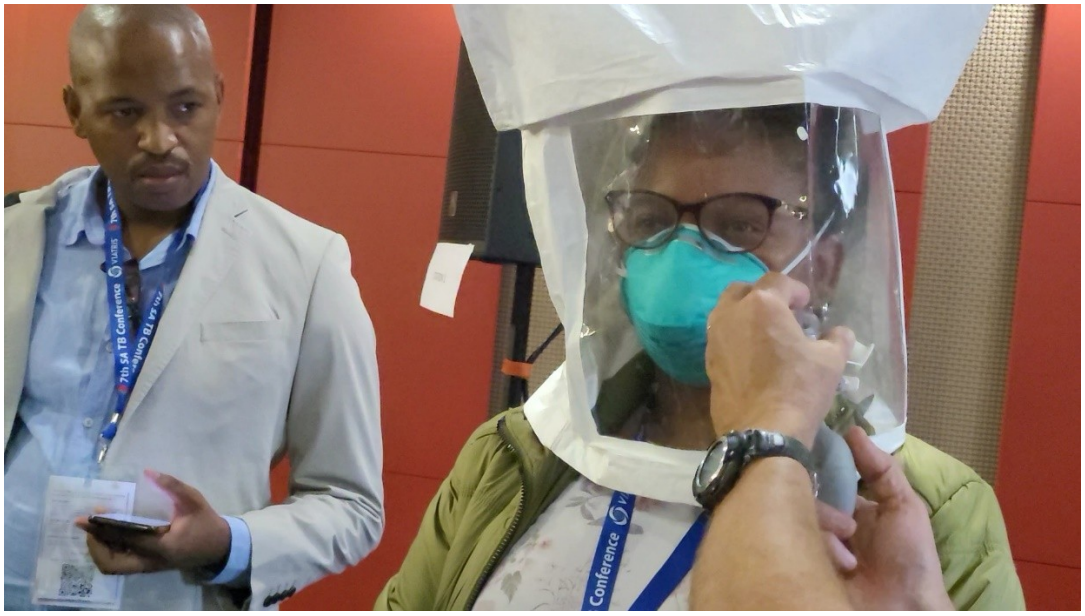
- to train participants on performing qualitative respirator fit test;
- to discuss in detail practical issues and personal respiratory protection program implementation.

Outline:

- Purpose and design of surgical masks, cloth masks and particulate respirators
- International respirator standards
- Disposable respirator donning and doffing
- Qualitative respirator fit test procedure
- Content of respirator fit test kit
- Preparation of sensitivity and challenge solutions for Bitrex (tm)
- Content of respirator fit test report
- Risks related to the use of a disposable respirator with an exhalation valve
- Practical issues of respirator procurement
- Available informational resources on personal respiratory protection

Key message:

- Personal respiratory protection program is an effective and feasible measure to reduce transmission of *M. tuberculosis*, SARS-CoV-2 and other airborne pathogens.
- Qualitative respirator fit testing is a key component of effective Personal Respiratory Protection program.



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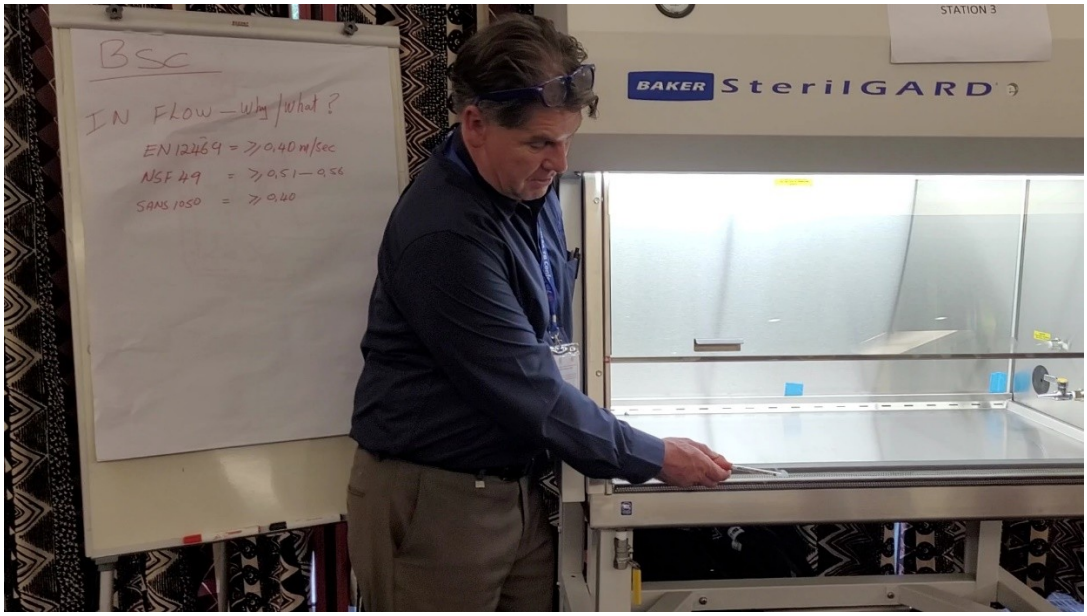
3. Practical exercise: Biosafety cabinets (BSCs)

Lecturer: Gregers Chalker, Director, Air Filter Maintenance Services, Johannesburg, South Africa.

During the practical exercise, the following topics were discussed:

- Biological Safety Cabinet classification, design and operation;
- BSC standards and key requirements;
- Safe working practices;
- Laboratory Room layout and correct placement of a BSC;
- BSC routine maintenance and cleaning, use of 70% alcohol for disinfection;
- BSC UV lamp replacement requirements.



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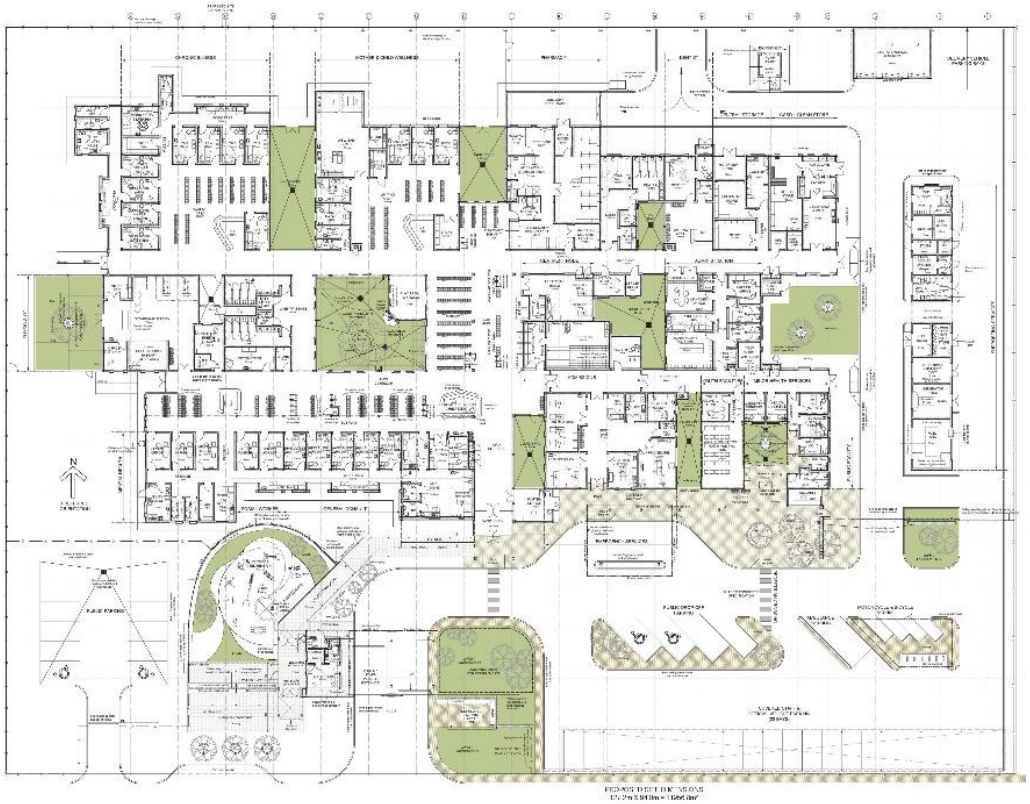
4. Practical exercise: Patient flow & building design

Lecturer: Jako Nice, principle architect at Studio Konstruk; senior lecturer - Tshwane University of Technology, Pretoria, South Africa.

This assignment is a two (2) part assessment and involves working with a plan of a Community Health Centre (CHC):



Task #1: Assessment of a Community Health Centre (CHC) PHC facility.

Critically assess the provided CHC floor plan and identify the following components:

1. Identify the flow routes for:
   - patients and patient types;
   - staff – doctors;
   - staff – nurses;
   - visitors;
   - services.
2. Identify program-related shortcomings (i.e. lack of a particular department, service or other).
3. Consider the requirement for ventilation and the burden of airborne disease in South Africa (TB, COVID-19 etc.) and discuss the design response.
4. Consider and discuss various types of waste (medical, food, general), routes and removal at the HCF.

Task #2: Conceptual design proposal of changes to the Community Health Centre (CHC).

Critically assess the provided CHC floor plan and identify the following components:

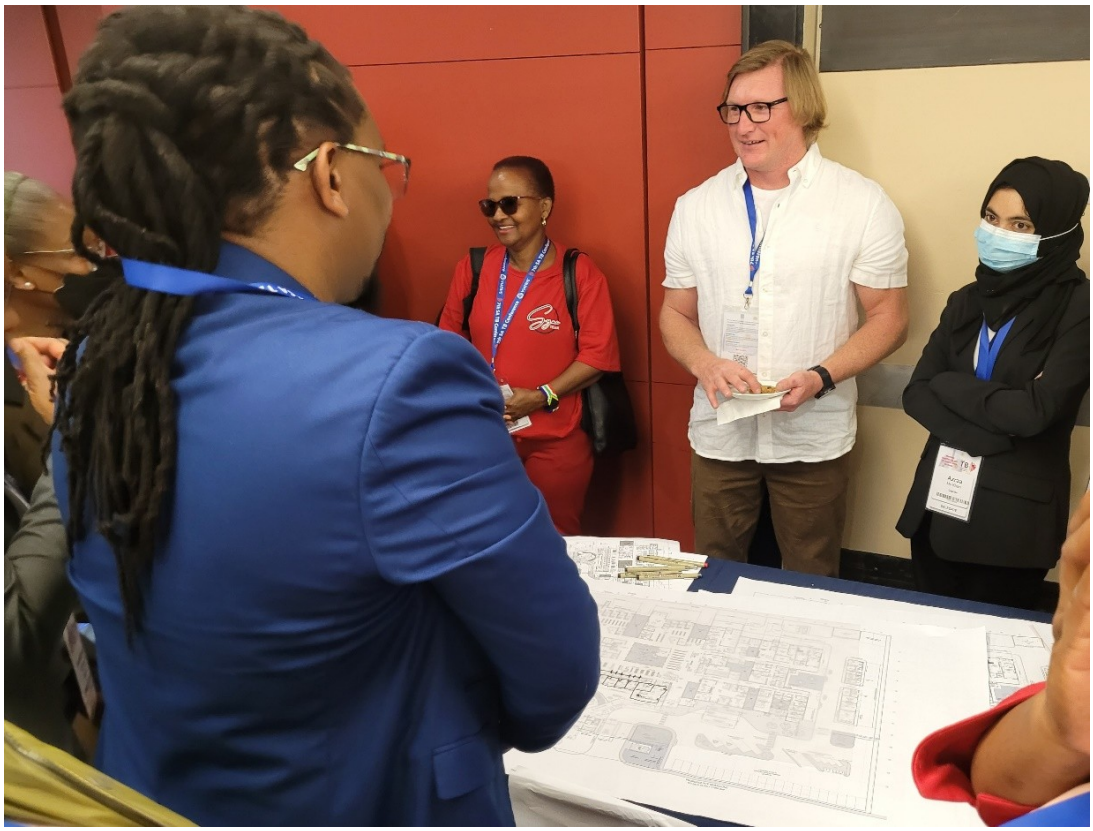
Illustrate this through sketches, images, and diagrams showing:
- altered floor plan;
- flow routes;
- ventilation needs and requirements.

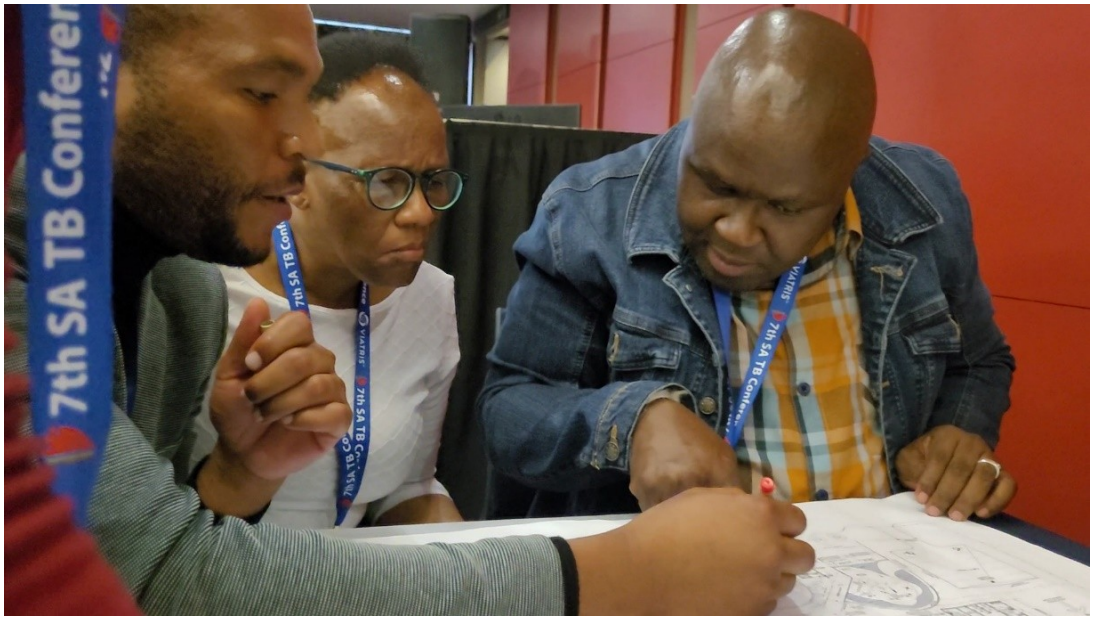
In this assignment, participants are required to assess the prototype design of a primary healthcare facility rapidly, systematically and critically and then improve upon it.
This assignment aims to develop HCW's critical assessment of built environment spaces for the applications and guidance in retro fitment, as-built conditions and new planning layouts considering the earlier lectures/presentations.

Outcome: Clear evidence of IPC, design planning and guidance. Skills developed to critically assess HEALTHCARE FACILITY layouts and propose IPC solutions.

CHECKLIST
FOR IDENTIFICATION & CRITICAL CONSIDERATION

2	Communications, approval process and representative teams	26	Specimen (urine and sputum) collections and testing
3	Land ownership/ tenure, EIA, Heritage and bulk services	27	Typical consulting room and counselling room
4	Functional zones	28	Storage areas
5	Patient streams	29	Staff areas
6	Acute services patient, staff and goods flow	30	Community
7	Chronic conditions patient, staff and goods flow	31	Cleaner's room
8	Women and child health patient, staff and goods flow	32	Engineering plant rooms
9	Dental service	33	Floor area efficiency
10	Waste management flows (including dirty utility & waste storage)	34	Extensibility
11	Support services checklist	35	Site orientation and location on site
12	Adjacency requirements review	36	Building envelope design (including roof)
13	Vehicle access, parking and provision for public transport	37	Daylighting
14	Pedestrian access	38	Wayfinding and legibility
15	Disability access and ablution	39	Ventilation
16	Number of ablution facilities	40	Safety and security
17	Waiting area sizes	41	Water and sanitation
18	Waiting area ventilation	42	Operational budget, staff available
19	Play area	43	Maintenance and maintainability
20	Help desk	44	Community participation
21	General reception and records counter	45	Approved STP, business case
22	Records and IT switch room	46	Review submission requirements
23	Central Chronic Medicine Dispensing & Distribution and pharmacy	24	Emergency room
24	Emergency room	25	Preparations/vitals room
25	Preparations/vitals room	26	Specimen (urine and sputum) collections and testing





You can watch a short video with a practical exercise here.

5. Practical exercise: Optimizing patient flows in health care facilities

Lecturer: Dr Matsie Mphahlele, Senior Technical Advisor, the Aurum Institute, Pretoria, South Africa.

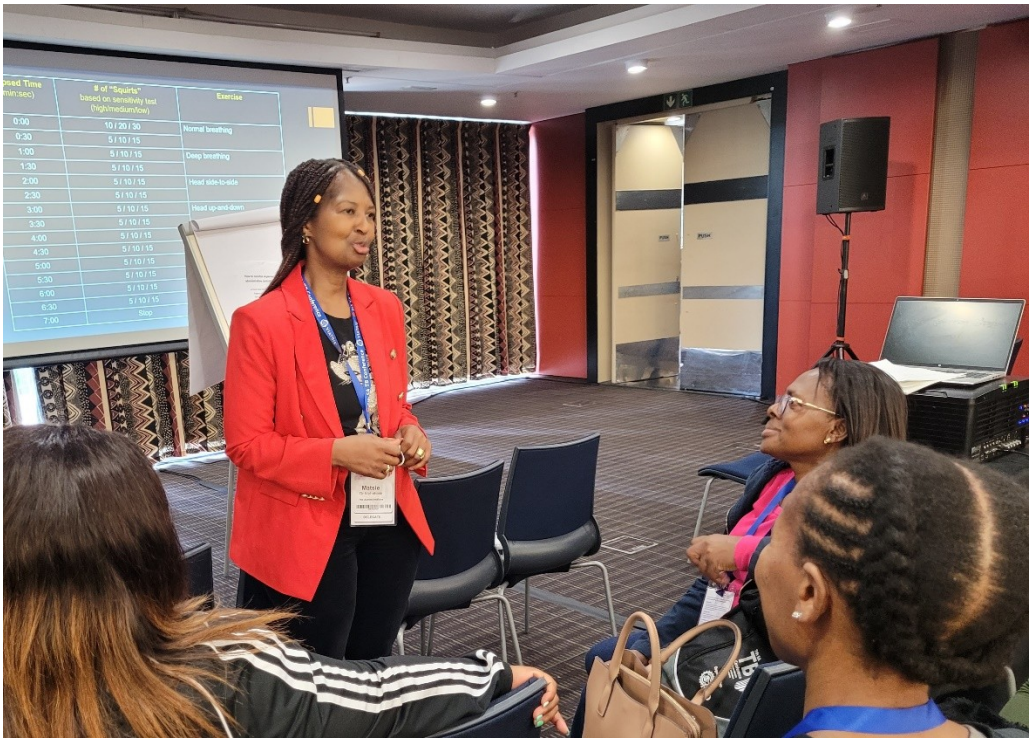
During the practical exercise, the following topics were discussed:

What can we do to improve patient flows? What IPC measures are needed to improve or put in place and ensure that we do not expose people to infectious diseases?

- Conducting risk assessment in the health facilities;
- Staff and patients' education on airborne IPC;
- TB transmission risk related signage;
- IPC program implementation (SOPs, responsible person, government role);
- Monitoring implementation of IPC measures.

To monitor implementation of administrative controls one should use performance indicators. To ensure rapid diagnosis of respiratory infection, separation and prompt treatment initiation => Check time intervals between: patient admission – ordering sputum collection – collecting sputum – receiving results – separating the patient – initiating appropriate treatment.

If delays are reported, what needs to be corrected to avoid exposure from happening again?



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