Strategies to support the COVID-19 response in LMICs

A virtual seminar series
SARS-CoV-2 Infection Control in the Outpatient Setting: Rational rationing of PPE and COVID-19 Preparation and Response

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SARS-CoV-2 Infection Control in the Outpatient Setting: Rationale rationing of PPE

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What is Infection Control?

• Infection Control (IC): Work practices and other measures designed to prevent transmission of infectious agents

Standard (Universal) Precautions + Transmission-Based Precautions
Recognizing SARS-CoV-2

Symptoms

Most common symptoms:
• Fever, dry cough, fatigue

Less common symptoms:
• Loss of taste or smell
• Headache
• Aches and pains
• Sore throat
• Diarrhea
• A rash on skin, or discolouration of fingers or toes

Serious symptoms:
• Difficulty breathing or shortness of breath.
• Chest pain or pressure.
• Loss of speech or movement.
IC: Levels of Infection Protection and Control

**Administrative**
- Symptom screening
- Cough etiquette
- Separation/Fast tracking
- Prompt diagnosis
- Staff training
- Patient education

**Environmental**
- Natural ventilation
- Mechanical ventilation
- High Efficiency Particulate Air Filtration (HEPA)

**Personal Protective**
- Staff awareness
- Personal respiratory protection
- Eye protections
- PPE Stock
Administrative Controls

- Promptly identify people with COVID-19 symptoms (triage)

- Separate symptomatic patients when possible
  - In inpatient settings at least 2 meters between patient beds if unable to cohort

- Ensure patients practice cough etiquette
  - Posted signs to patients and family
  - Covering nose and mouth when coughing with tissues or masks
  - Washing hands after contact with respiratory secretions

- Minimize time spent in health facilities (fast track patients with cough); Design the queue outside; space people 2 meters while in queue

- Consider outdoor clinical care, when possible
Environmental Controls

Natural Ventilation

Created by the use of external natural forces such as wind and temperature. Relies on open windows and doors to allow the air to move in and out of the room.

High Efficiency Particulate Air (HEPA) Filtration

Used to clean air which is recirculated to other areas of a facility. Can also be used in areas with poor ventilation. Note: recirculating air from areas intended to isolate a patient with TB is not recommended.

Mechanical Ventilation

Refers to the use of technological equipment to circulate and move air in a building. Works by generating negative or positive pressure in the room to drive air changes.

Ultraviolet germicidal irradiation (UVGI)

UVGI is a disinfection method that uses ultraviolet light at short wavelengths to kill microorganisms like TB.
Respiratory Protection Controls

- Implementing a respiratory-protection program
- Training health care workers on respiratory protection
- Educating patients on respiratory hygiene and the importance of covering their cough

Personal Protective Equipment: Are all masks the same?
Comparing PPE Masks

Surgical Mask

**Purpose:**
To reduce transmission by capturing bacilli expelled by a coughing TB patient into the air before they get into the air.

**Who should wear it:**
Patients with symptoms
Patients without symptoms (if available)
HCWs in low risk settings (administration)

**Where Should It Be Used:**
- In the waiting rooms, consulting rooms and when leaving the isolation ward for any reason
- During transportation i.e. ambulance, patient transport vehicles or other
- At home if isolation is not possible, ventilation inadequate and there are children <5 years

Respirator

**Purpose:**
To reduce exposure in the air before the air.

**Who should wear it:**
Health facility staff at high risk

**Where Should It Be Used:**
- Isolation wards
- Sputum induction areas/booth
- Casually/ Theater
- Other high risk areas based on the risk assessment
- During transportation especially when sharing the vehicle with a person with COVID19
- Community health workers/ visitor in the home of a patient with COVID19
- Screening tent at community clinics
What is an N95 Respirator?

An N95 respirator is a filtering facepiece respirator (FFR) that filters out at least 95% of airborne particles free of oil⁴,⁴,⁵,⁶.

![Diagram of N95 Respirator](https://static1.squarespace.com/static/5e8126f89327941b9453eef/t/5ea7bbadccc886265eebc288/1588050862097/200427_N95_Schematic_Release_v15.pdf)

### KEY FUNCTIONAL FEATURES

- **Filtration Layer**: Primary filtration is provided by a layer of nonwoven electrically charged melt blown polypropylene fibers⁴,⁴,⁵,⁶, 7. Electric charge on fibers results in high filtration efficiency and low resistance to breathing, low pressure drop⁶, ⁷.
- **Seal to Face**: Proper seal forces air through filtration layer⁴,⁴,⁵,⁶, 7. Procedures to ensure proper seal:
  - Fit testing (yearly)⁷
  - Donning procedures⁷
  - Seal checking procedures (every day)⁷
- **Inadequate Seal**: Inadequate seal allows harmful particles to leak around respirator edges⁴,⁴,⁵,⁶, 7. Inadequate seal may occur due to:
  - Poor fit to user’s face⁷
  - Structural degradation (tears, nose clip, etc.)⁷
  - Facial hair along sealing region⁷

### CAUTION!

Filtration efficiency can be reduced by physical damage to fiber or static charge degradation⁴,⁴,⁵,⁶.

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**Supporting Resources**:
- [NIOSH CDC](https://www.cdc.gov/niosh/topics/respiratory/index.html)
- [NIOSH EPD](https://www.cdc.gov/niosh/topics/respiratory/NIOSH-EPD.html)
- [NIOSH NIOSH](https://www.cdc.gov/niosh/)
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[www.n95decon.org](https://www.n95decon.org)
Respiratory Use and Reuse

Respirators are disposable but can be re-used until it becomes damaged, breathing becomes difficult, or it becomes contaminated with blood or other body fluids.

A REUSABLE RESPIRATOR IS BETTER THAN NO RESPIRATOR

• Respirators are to be inspected prior to each use to ensure proper fit and seal
• Store in a dry place
• Do NOT write on the respirator
• Do NOT bend the respirator
• Dispose of respirator if you question its performance & you have a replacement
Best practice is to use new N95s. Decontamination does not solve the PPE shortage crisis, and is an emergency practice to be considered during the COVID-19 pandemic. Efficacy and safety of N95 decontamination has not been fully characterized.

**PROMISING METHODS**

Use of humid heat, UV-C, and hydrogen peroxide vapor as decontamination methods have been supported in the literature. For data and cautions specific to these reuse methods, visit: [www.n95decon.org/publications](http://www.n95decon.org/publications)

- Humid heat
- Hydrogen peroxide vapor
- UV-C radiation

**UNSUITABLE METHODS**

Data indicates these methods significantly compromise N95 filtration efficiency or do not sufficiently inactivate biological contaminants. Do not employ for N95 decontamination.

- **Soapy water**: Soaking in soapy water has been shown to degrade filtration of multiple N95 models.1,2
- **Application of alcohols such as isopropanol or ethanol has been shown to degrade the filtration efficiency of at least one N95 model.**1,2,3
- **Products to avoid include:**
  - Liquid disinfectants that contain alcohol as an ingredient
  - Alcohol-based hand sanitizers
  - Alcohol-containing disinfectant wipes
- **Bleach immersion**: Immersion in bleach-containing solutions has been shown to degrade N95 filtration efficiency.4 However, wiping 3 times with a fresh bleach-containing wipe (0.9% hypochlorite) has been shown NOT to cause damage to multiple N95 models, and can decontaminate for at least one model pathogen.4
  - **Bleach residue has health risks, especially for asthmatic or sensitized people.**5
  > 18hr off-gassing in a fume hood has been shown to reduce residue.5
  - **Products to avoid include:**
  >  - Bleach-based liquid disinfectants
- **Overnight storage**: SARS-CoV-2 has been shown to remain active on surfaces for 3 or more days, indicating that overnight storage at room temperature does not sufficiently decontaminate N95s.6,7

**SUPPORTING RESEARCH**


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Infection Control at Home and in the Community

**TBIC measures at home and in the community:**

- Ventilation/open windows
- Isolation of patient (ideally own bedroom)
- Cough hygiene
- Refraining from close contacts
- Maximising time in open-air environment (e.g., receive visitors outside, if you must)
Good or Bad IC?
Good or Bad IC?
Good or Bad IC?
Good or Bad IC?
Voice of Comfort, Practice, and Science
The Human Pathogen Coronaviruses

Four Common Human Coronaviruses
- 229E
- NL63
- OC43
- HKU1

Three Other Human Coronaviruses
- SARS
- SARS-CoV-2
- MERS
Principles of Public Health Emergency Preparedness and Outbreak Management

• “Outbreaks are urgent emergencies accompanied by rapid efforts to care for cases, prevent further spread, and bring the outbreak under control. Decisions, often with life-saving potential, need to be made rapidly and actions need to be followed promptly.”

—World Health Organization 2005
Pandemic Response

• Proper case identification
• Basic and enhanced infection prevention and control (IPC) practices
• Data collection
• Communication
• Essential health services must still be maintained
Principles of Emergency Management
Key Steps in Preparedness

• Creating a strong disease surveillance system
  • Case definitions
  • Screening and triage processes

• Reinforcing IPC practices

• Coordinating with health ministries or other public health authorities

• Partnering with the community for education, involvement, and communication

• Performing drills and tests of the system
Many facilities use the formal Incident Command System (ICS) when responding to an emergency.

ICS is a management system aimed at using a common organizational structure to respond to an incident.

ICS can be used across many different disciplines and in many types of incidents, including public health emergencies.

ICS usually takes into account activities involving command, operations, planning, logistics, and finance and administration. (FEMA)
# IPC Topics for Staff Education

Adapted from: Rebmann 2009.

<table>
<thead>
<tr>
<th>Self-screening for illness</th>
<th>Hand hygiene</th>
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</thead>
<tbody>
<tr>
<td>Screening and triage of patients</td>
<td>Handling contaminated linens</td>
</tr>
<tr>
<td>Internal and external reporting of communicable diseases</td>
<td>Obtaining and handling specimens</td>
</tr>
<tr>
<td>Surveillance</td>
<td>Environmental cleaning and disinfection</td>
</tr>
<tr>
<td>Emergency management plan and procedures</td>
<td>Cleaning, disinfection, and sterilization of medical equipment and devices</td>
</tr>
<tr>
<td>Modes of disease transmission</td>
<td>Waste management procedures</td>
</tr>
<tr>
<td>Standard precautions</td>
<td>Decontamination procedures</td>
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<tr>
<td>Transmission-Based Precautions</td>
<td>Postmortem care</td>
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<tr>
<td>Respiratory etiquette</td>
<td>Vaccination</td>
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<tr>
<td>Use and reuse of PPE</td>
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## Extended Response Activities

### Extended Response: Ongoing Public Health Emergency Response Functions and Tasks from 24 Hours Onward

- Identify environmental hazards.
- Assess potential hazards.
- Assess epidemiological services.
- Assess health and medical needs.
- Identify and treat affected individuals.
- Control contamination.
- Conduct surveillance, include laboratory.
- Manage wastes.
- Quarantine and isolate affected individuals.

<table>
<thead>
<tr>
<th>Tasks from 24 Hours Onward</th>
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<tbody>
<tr>
<td>Provide public health information.</td>
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<tr>
<td>Communicate with facility staff and community.</td>
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<tr>
<td>Assess responder safety and health.</td>
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<tr>
<td>Assess overall health and medical personnel resources.</td>
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<tr>
<td>Check health and medical equipment availability.</td>
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<tr>
<td>Organize health-related volunteers and donations.</td>
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<tr>
<td>Review in-hospital care.</td>
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<tr>
<td>Plan evacuation and sheltering in place.</td>
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</tbody>
</table>

- Manage trauma and fatalities.
- Assess morgue services and disposal of human remains.
- Initiate mental health and social services.
- Ensure water and food safety.
- Control vectors.
- Review sanitation and hygiene practices.
- Maintain routine services.
- Coordinate with veterinary services.
- Plan long-term community recovery.

*Adapted from: CDC 2011b.*

**jhpiego Infection Prevention and Control: Reference Manual for Health Care Facilities with Limited Resources:** March 2018
Outbreak Communication and Information Dissemination

• Build trust
• Announce early
• Be transparent
• Respect public concerns
• Plan in advance

(WHO 2005)
Employee health during a pandemic

• Employee safety is a top priority during the care of patients under investigation or known to have COVID-19

• Important considerations:
  • Critical steps to provide a safe workplace during a pandemic
  • Services to support all staff
  • Mental health impact: current and ongoing
Providing a safe workplace during COVID-19

- Environmental controls
  - Negative pressure rooms and units
  - Anterooms, signage, HEPA filtration, pressure monitoring
- Personal protective equipment
  - Respirators, masks, gowns, gloves, face shields
  - Universal masking
- Safety officer program
- IPC on-site support and guidance
- Mental health support for employees
Employee Exposures

- Occasional patients unrecognized to have COVID-19
- Employee and community-based exposures
- Importance of not working when ill
- Mitigation strategies to prevent exposures
  - PPE
  - Hand washing
  - Social distancing
  - Patient testing
  - Symptom screening
Employees are on the front lines, where they may suffer risk of infection and psychological distress.

This may accelerate the risk of healthcare worker burnout.

Potential Impact:
- Short-term: healthcare worker well-being and resilience may be eroded, and absenteeism might increase
- Potential inability to maintain workforce needed for patient care
- Long-term: possible psychological distress can lead to burn-out, PTSD, other mental health disability or exacerbation of mental health conditions
Psychological Support Based on Phase of Pandemic Response

### Continuum of Coordinated Psychological Care

<table>
<thead>
<tr>
<th>Focus of Care</th>
<th>Supporting Rebound</th>
<th>Supporting Recovery and Moving On</th>
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<tbody>
<tr>
<td><strong>Strengthening psychological and behavioral immunity</strong></td>
<td>Monitor level of psychological distress; Psychological First Aid; Group/unit support; Spiritual care; Promote wellness practice and self care.</td>
<td>Monitor level of psychological distress; be sensitive to anniversary reactions; Healing groups; Spiritual care; Psychiatric assessment and therapeutic care; Promote wellness and self care.</td>
</tr>
<tr>
<td><strong>Types of Care</strong></td>
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<tr>
<td><strong>JHM Resources</strong></td>
<td>RISE, mySupport, Spiritual care; Moral resilience rounds; Healthy at Hopkins; Office of Well-being</td>
<td>mySupport; Psychiatric assessment and therapeutic care; Spiritual Care; Healthy at Hopkins; Office of Well-being</td>
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Developed on behalf of the Office of Well-Being by George S. Everly, Jr., PhD; Carolyn J. Fowler, PhD, MPH; Albert W. Wu, MD, MPH and Deborah Dang, PhD, RN
RISE
Resilience In Stressful Events

“Provide timely peer support to workers who encounter stressful patient related events”
QUESTIONS?