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Abbreviations and acronyms

AMR	antimicrobial resistance
ARI	acute respiratory infection
BeSDV	behavioural and social drivers of vaccination
COVID-19	coronavirus disease 2019
CoViNet	Global Coronavirus Laboratory Network
EHS	essential health services
EMT	emergency medical team
FAO	Food and Agriculture Organization of the United Nations
GISAID	Global Initiative on Sharing All Influenza Data
GISRS	Global Influenza Surveillance and Response System
GOARN	Global Outbreak Alert and Response Network
HCWs	health and care workers
HEPR	health emergency preparedness, response and resilience
IHR (2005)	International Health Regulations (2005)
ILI	influenza-like illness
IPC	infection, prevention and control
JEE	joint external evaluation
LIMS	laboratory information management system
MERS	Middle East respiratory syndrome
MERS-CoV	Middle East respiratory syndrome coronavirus
NAPHS	national action plan for health security
NDVP	national deployment and vaccination plan
NIC	National Influenza Centre
NITAG	national immunization technical advisory group
PHEIC	Public Health Emergency of International Concern
PHEOC	Public Health Emergency Operations Centre
PHSM	public health and social measures
PIP	pandemic influenza preparedness
PISA	Pandemic Influenza Severity Assessment
POC	point-of-care
PoE	points of entry
PPE	personal protective equipment
PRET	Preparedness and Resilience for Emerging Threats
RCCE	risk communication and community engagement
RSV	respiratory syncytial virus
RT-PCR	reverse transcription polymerase chain reaction
SAGE	Strategic Advisory Group of Experts on Immunization
SARI	severe acute respiratory infection
SARS	severe acute respiratory syndrome
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
SOPs	standard operating procedures
SPAR	State Party Self-Assessment Annual Reporting
STAR	Strategic Toolkit for Assessing Risks
TIPRA	Tool for Influenza Pandemic Risk Assessment
UHC	universal health coverage
UN	United Nations
WASH	water, sanitation and hygiene
WHO	World Health Organization
WOAH	World Organisation for Animal Health (founded as OIE)

1 Introduction

Preparing for respiratory pathogen pandemics

The unpredictable and recurring nature of respiratory pathogen pandemics, along with the potentially catastrophic consequences for human health and socioeconomic well-being, makes preparation to address this important public health threat critical. The latest coronavirus disease 2019 (COVID-19) pandemic has taught us that an urgent need remains for greater levels of advance planning and for strengthened preparedness and response capacities in countries. Pandemic preparedness also presents opportunities to strengthen preparedness and response to other health threats. Respiratory pathogen pandemic preparedness and response needs to be underpinned by a foundation of resilient communities, multisectoral systems and core capacities for emergencies (*1*, *2*).

Many of the core capacities needed to manage a pandemic – in areas such as emergency coordination, collaborative surveillance, community protection, clinical care and access to countermeasures – are common to the management of other public health emergencies and are recognized in the International health regulations (IHR) (2005) (*3*), the global architecture for health emergency preparedness, response and resilience (HEPR) (*4*) and the PIP Framework (*5*). Thus, maintaining a national pandemic preparedness plan contributes to overall national preparedness and global health security. Indeed, a plan should be comprehensive, cross-sectoral and supported by global coordination, for example for medical supplies, including vaccine production and distribution (*6*).

This checklist is part of the WHO Preparedness and Resilience for Emerging Threats (PRET) initiative Module 1 on respiratory pathogens (*2*). PRET is an innovative, hazards-based approach to improving pandemic preparedness. The PRET initiative recognizes that the same systems, capacities, knowledge and tools can be leveraged and applied for groups of pathogens based on their mode of transmission (e.g. respiratory, vector-borne, foodborne). PRET incorporates the latest tools and approaches for shared learning and collective action established during the COVID-19 pandemic and other recent public health emergencies. For more information, see the PRET initiative website (1): https://www.who.int/initiatives/preparedness-and-resilience-for-emerging-threats

Purpose and scope

This checklist **is an operational tool to help national authorities develop or revise national respiratory pathogen pandemic preparedness plans**, in conjunction with Preparedness and resilience for emerging threats (PRET) module 1: planning for respiratory pathogen pandemics (*2*) (see the section on "audience and use"). This checklist builds from the 2018 WHO checklist for pandemic influenza risk and impact management: building capacity for pandemic response (*7*) and COVID-19 Strategic Preparedness and Response Plan operational checklists and associated tools (*8*), with a focus on the similar capacities that could be leveraged for different respiratory pathogens of pandemic potential to make pandemic planning more efficient and integrated.

To strengthen preparedness, countries are encouraged to leverage what exists and to take two mutually reinforcing approaches: a **cross-cutting all-hazards approach and a vertical hazard (groups of pathogens based on their mode of transmission) approach** (see PRET Module 1: Fig. 6). The scope of the checklist therefore covers **all respiratory pathogens of pandemic potential**, including the threat of novel respiratory pathogen X. The checklist also includes specific actions for **key respiratory-borne RNA viruses identified as being of heightened pandemic risk, particularly actions for influenza and coronaviruses**. Other respiratory viruses (such as paramyxoviruses, pneumoviruses and picornaviruses (*9*); see also PRET Module 1: section 3.4 and Table 2) may also pose issues in your country or context and can be included in your preparedness plans if considered a country priority. This checklist is a living document, and future versions may be updated to include additional preparedness activities for other specific pathogens, including bacterial pathogens.

The checklist outlines the capacities and capabilities that countries need in order to respond to a respiratory pathogen pandemic for the "**prevent and prepare" operational stage** (see PRET Module 1: Fig. 4 and Chapter 4). National respiratory pathogen pandemic preparedness plans should be operational and, therefore, action orientated. Accordingly, each section of this checklist presents **suggested actions that countries can take now in order to be better prepared for a pandemic**. Some actions, if not already being undertaken routinely, should be integrated into routine systems for sustainability because they provide the foundation for pandemic preparedness and response. Other actions are specific planning actions which need to be implemented ahead of the start of a pandemic (e.g. the need to plan for surge capacity, stockpiles of medicines, essential service continuity).

This checklist contains actions that may be considered part of operational readiness (i.e. actions that can be taken soon after the emergence of a new pathogen with pandemic potential). This checklist is **not** intended to serve as standard operating procedures (SOPs). Once an emerging respiratory pathogen threat is detected, plans and SOPs need to be developed for the pathogen and context. These should be specific to both the context at the time of the event and pathogen-related parameters such as transmissibility and disease severity (see PRET Module 1: Table 3).

PRET and this checklist place equity, inclusivity and coherence at the forefront of pandemic preparedness. The actions underscore multisectoral and multidisciplinary approaches to pandemic preparedness planning, in recognition of the contributions needed from all segments of society (whole-of-society approach). However, responsible agencies in other sectors should also develop pandemic-specific plans according to their own requirements, referring to this document and the cited key resources for guidance.

This document has been developed to take into account:

- health system core capacity requirements under the IHR (2005) (3), (see section on the "structure of the checklist");
- lessons learned from the influenza A(H1N1) 2009 pandemic, the COVID-19 pandemic (see PRET Module 1: Chapter 2) as well as from outbreaks of severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and seasonal influenza epidemics;

- updated WHO guidance on topics related to pandemic influenza, COVID-19 and public health emergency planning, risk and severity assessment; and
- the five components outlined in the WHO health emergency preparedness, response and resilience (HEPR) architecture (*4*).

Audience and use

This checklist is intended to be used by national authorities responsible for pandemic preparedness and response (for target audiences, see PRET Module 1: Table 1) **in conjunction with PRET Module 1 as well as other generic or disease-specific preparedness resources.** The checklist follows the same system components as PRET Module 1 (see PRET Module 1: Chapter 5) and elaborates on the actions to include within national respiratory pathogen pandemic preparedness plans for each system component during the **prevent and prepare** stage (see PRET Module 1: Chapter 10, part E).

Countries can use the checklist to assess their current status in terms of capacities, capabilities and preparedness planning to help identify gaps and therefore priority actions to be included in developing or revising their national pandemic preparedness plans. When including actions in national plans, they should be adapted to country context and consider aspects such as country vulnerability profile, level of available resources and specific lessons learned from previous pandemics.

In addition, countries that have completed an IHR 2005 State party self-assessment annual reporting (SPAR) tool (10) or Joint external evaluation (JEE) (*11*) can use this checklist to link the implementation of SPAR/JEE recommendations and pandemic preparedness planning (see section on "structure of the checklist" below and Annex 1). Furthermore, all countries may consider coordinating capacity strengthening efforts across different initiatives by incorporating national respiratory pathogen pandemic preparedness into their national action plan for health security (NAPHS) (*12, 13*) and routine planning and financing cycles (see PRET Module 1: Fig. 2).

Structure of the checklist

Actions

The actions in the main parts of this checklist are applicable to **respiratory pathogens of pandemic potential** (for examples of respiratory viruses, see PRET Module 1: Table 2).

When pathogen-specific actions (currently for influenza viruses and coronaviruses) have been identified, these are contained within boxes.

As all-hazard core capacity strengthening actions are the foundation for preparedness, **the all-hazard actions relevant to each section have been included in** Annex 1 of this checklist and are mapped to the IHR (2005) core capacities (see Annex 1). A link is provided from the "all-hazard" action at the end of each subsection. Using this checklist will therefore also strengthen the IHR core capacities.

Linkage to PRET Module 1: Each main section of this checklist is linked to the rational and relevant sections (which describe core capacities by system component) in PRET Module 1: Chapter 5.

Resources

Key select resources are hyperlinked under the actions they relate to in order to support countries in pandemic preparedness planning at a national and local level. These resources are not exhaustive, and pandemic planners are encouraged to seek out additional resources (including within PRET Module 1 and IHR tools, see references) to suit their contexts and needs.

Most recent respiratory pathogen guidance was produced for the COVID-19 pandemic and can be found by subject area, here: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance. For influenza-specific guidance, see the WHO Global Influenza Programme webpage, here: https://www.who.int/teams/global-influenza-programme and for MERS, the WHO webpage here: https://www.who.int/health-topics/middle-east-respiratory-syndrome-coronavirus-mers. Training courses on many subjects can be found at OpenWHO.org and through other reputable providers (see those linked in this document).

II System components and capacities for respiratory pathogen pandemic preparedness

1 Emergency coordination (See PRET Module 1: section 5.1)

1.1 Planning

- ❑ **Conduct a landscape analysis of capabilities and capacities, as well as mapping of key national/subnational actors, partners and stakeholders** to identify who should be involved in the respiratory pathogen preparedness planning process, including their roles and responsibilities.

- ❑ **Revise or develop the national respiratory pathogen pandemic preparedness plan** based on lessons identified from COVID-19 and other major events and ensure that it aligns with existing all-hazard plans, the NAPHS and relevant regional and bi-regional strategies.
  - It is suggested that the plan follow the outline in Chapter 10 of PRET Module 1, and include the elements described in PRET Module 1 and the relevant actions in this checklist.
  - Pathogen-specific sections or annexes for priority respiratory pathogens of pandemic potential will be required (see PRET Module 1: Chapter 6.1).

- Develop a monitoring and evaluation framework for the respiratory pathogen preparedness plan (see Chapter 6 on monitoring, evaluating, testing and revising plans).

See WHO webpage: National Action Plan for Health Security (NAPHS) (accessed 14 June 2023).

❑ **Encourage multisector collaboration (e.g. animal health, security, transport and education, see PRET Module 1: Box 3 and Annex 2), including a whole-of-government and whole-of-society approach (all levels: national to community) for planning**, including integration of the national respiratory pathogen pandemic preparedness plan with national health emergency and disaster management plans.

WHO guidance on preparing for national response to health emergencies and disasters. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/350838, accessed 14 June 2023).

❑ **Engage with other countries and international entities** on respiratory pathogen pandemic preparedness planning (e.g. partnerships, meetings, exercises; see Chapter 6 on monitoring, evaluating, testing and revising plans).

❑ **Foundational all-hazard actions** on planning (see Annex 1: A1.1).

1.2 Policy, legal and normative instruments

❑ **Review, develop and update policy, legal and normative instruments based on lessons identified from COVID-19 to support respiratory pathogen pandemic preparedness and response** through engaging a broad range of multilevel (national to community) and multisectoral stakeholders (see PRET Module 1: Box 3 and Annex 2). In doing so, pay particular attention to:

- systematically integrating public health and social measures (PHSM) policy and guidance into instruments and **assess the legal and ethical bases of each PHSM that are likely to be proposed during a pandemic response** (see section 1.6 on guiding principles, gender and ethical considerations and section 3.4 on risk communication and community engagement (RCCE));
- multilevel coordination and role of political leadership;
- participation of private health care actors and academia;
- adequate protection of patient privacy and confidentiality and identifiable data;
- coordinating legal and regulatory frameworks between and within sectors;
- arrangements for social safety net policies, mutual aid and service continuity;
- provisions to operationalize equity, inclusivity and coherence (see PRET Module 1: Chapter 3.1); and
- an avenue to deal with complaints (e.g. an ombudsperson) and to acknowledge that processes can be subject to external scrutiny.

See WHO webpage: Supporting national health policies, strategies, plans, including the national health planning toolkit (accessed 14 June 2023).

- ❑ **Disseminate and raise awareness about updated policy, legal and normative instruments to support respiratory pathogen pandemic preparedness and response** to facilitate timely and effective implementation of measures during an emergency.

- ❑ **Encourage multisector collaboration (see PRET Module 1: Box 3 and Annex 2) and a whole-of-government approach (all levels: national to community) to support and integrate respiratory pathogen pandemic preparedness and response legislation and policy into intersectoral national emergency and disaster risk management strategies and policies.**

- ❑ **Assess policy, legal and normative instruments in terms of liability for unforeseen adverse events** attributed to medical countermeasures for respiratory pathogens (e.g. vaccine, antiviral drug use), especially where the licensing process has been expedited. Liability issues may affect manufacturers, the licensing authority and those who administer the medical countermeasures.

- ❑ **Foundational all-hazard actions** on policy, legal and normative instruments (see Annex 1: A1.2).

1.3 Coordination

- ❑ **Establish or strengthen health sector coordination and communication mechanisms between government and non-state actors involved in respiratory pathogen pandemic preparedness and response activities at all levels**, including community leaders and representatives of vulnerable and marginalized populations (see PRET Module 1: Box 4) to mitigate health and economic disparities.

- ❑ **Establish a multisectoral committee, or leverage a similar existing multisectoral coordination mechanism,** to advance coordination of national respiratory pathogen pandemic preparedness and response activities between sectors at all levels. Terms of reference and roles and responsibilities should be defined, and membership kept current.

Multisectoral preparedness coordination framework: best practices, case studies and key elements of advancing multisectoral coordination for health emergency preparedness and health security. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/332220, accessed 14 June 2023).

- ❑ **Apply and strengthen routine collaboration, coordination and communication mechanisms** with neighbouring countries (including cross-border collaboration for coordinated surveillance, risk assessment and response) and regional and international stakeholders, including donors and multilateral agencies.

- ❑ Develop and maintain technical and operational readiness of an incident management system, including **public health emergency operations centre (PHEOC) capacities with SOPs and plans** to coordinate functions across all sectors and all levels (national, regional, local), including for a respiratory pathogen pandemic.

Framework for a public health emergency operations centre. Geneva: World Health Organization; 2015 (https://apps.who.int/iris/handle/10665/196135, accessed 14 June 2023.

See WHO webpage: WHO's Emergency Operations Centre Network (EOC-NET) (accessed 14 June 2023).

- ❑ **Foundational all-hazard actions** on coordination (see Annex 1: A1.3)

1.4 Financing

- ❑ **Ensure adequate multiyear budget (with dedicated budget lines) for pandemic preparedness, prevention and response and dedicate resources specifically to respiratory pathogen pandemic preparedness and response, and whole-of-government and whole-of-society programmes** that include gender equality/mainstreaming, equity and human rights. To undertake this, engage in a costing exercise of the preparedness plan, including development of an investment case for this area of work.

See WHO webpage: WHO's Resources Portal on Public Financial Management for Health (accessed 14 June 2023).

- ❑ **Develop or strengthen funding mechanisms for rapid access to emergency funds** by all sectors, and dispersion of these funds for respiratory pathogen pandemic response activities at a national, subnational and local level.

- ❑ **Consider and plan for alternative sources of funding** for respiratory pathogen pandemic response such as national contingency funds, external donations and sponsors. Consider agile financing with adequate risk tolerances, such as forgivable loans.

- ❑ **Foundational all-hazard actions** on financing (see Annex 1: A1.4).

1.5 Human resources

See Chapter 4 on clinical care regarding protecting health and care workers (HCWs) and patients.

- ❑ **Identify the health workforce needed to implement, manage and coordinate respiratory pathogen pandemic and response activities**, including:
  - validating estimates of current numbers, expertise or occupation and geographical distribution of HCWs, including clinical, allied health and public health workers (e.g. for surveillance, contact tracing, infection prevention and control (IPC), laboratory, maintenance of medical devices, risk communication and community engagement, vaccination) in both the public and private sector and at different facility levels;

- estimating additional staffing needs to resource essential services and functions (surge calculators can be used or adapted), including routine and pandemic immunization; and
- identifying roles that can be supported by redeployment, surge staff (including from other sectors) or volunteers/retirees.

National workforce capacity to implement the essential public health functions including a focus on emergency preparedness and response: action plan (2022–2024) for aligning WHO and partner contributions. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/363519, accessed 14 June 2023).

National workforce capacity to implement the essential public health functions including a focus on emergency preparedness and response: roadmap for aligning WHO and partner contributions. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/354384, accessed 14 June 2023).

See WHO webpages: Health workforce and Essential resource planning for surge calculator (accessed 14 June 2023).

❑ **Develop procedures and mechanisms to enable phased implementation and timely scale-up of surge capacity for respiratory pathogen pandemics** (quantity, availability and capability of HCWs), including:

- establishing and maintaining a registry of HCWs to be activated in emergency situations – which includes those specialized in respiratory diseases, including multidisciplinary professionals (clinical, allied health and public health workers) and surge human resources (including from other sectors, e.g. animal health for diagnostic testing);
- developing capacity-building programmes, including recruitment, preservice education, supervision and continuous learning;
- developing pathogen-specific training curricula for priority respiratory pathogens; and
- the inclusion of pandemic planning response capacities in the national strategy for public health workforce development and training programmes.

❑ **Review policies and regulatory measures to attract and retain HCWs during respiratory pathogen pandemics, including adequate working conditions** (including pay, insurance, incentives, sick leave, occupational health and safety, appropriate IPC practices and adequate personal protective equipment (PPE)), **task allocation** (i.e. manageable workloads, who is responsible for delivering which health services during a pandemic) **and facilities** (including access to technological infrastructure).

Caring for those who care: guide for the development and implementation of occupational health and safety programmes for health workers. Geneva: World Health Organization and International Labour Organization; 2022 (https://apps.who.int/iris/handle/10665/351436, accessed 14 June 2023).

- ❑ **Develop services to support staff during a respiratory pathogen pandemic** (e.g. health monitoring, mental health services/counselling, stress management, psychosocial support and pandemic vaccination).
- ❑ **Consider how and when international networks such as emergency medical teams (EMTs) will be mobilized** nationally, regionally and globally, through the Global Outbreak Alert and Response Network (GOARN), and used to support surge needs during respiratory pathogen pandemics.

See WHO webpages: emergency medical teams and Global Outbreak Alert and Response Network (GOARN) (accessed 14 June 2023).

- ❑ **Foundational all-hazard actions** on human resources (see Annex 1: A1.5).

1.6 Guiding principles, gender and ethical considerations

- ❑ **Establish or strengthen an ethical and inclusive decision-making framework** to provide a structured, systematic and consistent approach to analyse respiratory pathogen pandemic ethical issues.

See WHO webpage: Health Ethics & Governance (accessed 14 June 2023).

- ❑ **Establish or leverage existing ethics committees** to advise on respiratory pathogen pandemic preparedness and response activities, coordinating with existing national ethics structures.

- ❑ During respiratory pathogen pandemic preparedness planning, **take steps to mitigate and prevent a disproportionate impact in future respiratory pathogen pandemics based on key inequality dimensions**, including income, gender, sex, age, race, ethnicity, migration status, disability and geographic location, among others (see PRET Module 1: Boxes 1 and 2).

Guidance for managing ethical issues in infectious disease outbreaks. Geneva: World Health Organization; 2016 (https://apps.who.int/iris/handle/10665/250580, accessed 14 June 2023).

Addressing sex and gender in epidemic-prone infectious diseases. Geneva: World Health Organization; 2007 (https://apps.who.int/iris/handle/10665/43644, accessed 14 June 2023).

- ❑ **Foundational all-hazard actions** on guiding principles and ethical considerations (see Annex 1: A1.6).

2 Collaborative surveillance (See PRET Module 1: section 5.2)

2.1 Surveillance: overarching system considerations

- ❑ **Establish or strengthen a "mosaic" of surveillance approaches and capacities for respiratory pathogens** to guide pandemic decision making in line with clearly articulated priority public health objectives for (i) early detection and assessment, (ii) monitoring epidemiological characteristics and (iii) evaluating and informing the use of human health interventions, in line with WHO's mosaic respiratory surveillance framework.

> "Crafting the mosaic": a framework for resilient surveillance for respiratory viruses of epidemic and pandemic potential. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366689, accessed 14 June 2023) and associated virtual repository of existing supporting surveillance guidance and tools (accessed 20 July 2023).

- ❑ **Develop or update protocols for the systematic analysis (including multisectoral analysis where relevant) and multisectoral dissemination of respiratory pathogen surveillance data for action** (interpandemic and pandemic data).

- ❑ **Actively participate in global surveillance networks such as the Expanded Global Influenza Surveillance and Response System (GISRS) and/or the WHO Global Coronavirus Laboratory Network (CoViNet)**, including the timely, complete and consistent sharing of routine and pandemic **influenza and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) data and viruses** with WHO collaborating centres (including National Influenza Centres (NICs)) and Expanded GISRS (via RespiMART) for further analysis, characterization (phenotypic and genotypic testing), candidate vaccine development and risk assessment (see also section 2.4 on laboratory, and section 2.5 on One Health/zoonotic disease).

> See WHO webpages: Global Influenza Surveillance and Response System (GISRS), Call for expression of interest for reference laboratories of the WHO CoViNet, Terms of Reference for WHO reference laboratories providing confirmatory testing for COVID-19 (basis for the WHO Global Coronavirus Laboratory Network (CoViNet), National Influenza Centres and RespiMART (accessed 6 November 2023).

- ❑ **Undertake coordinated and non-duplicative regular evaluations** (through actual experience and/or simulation exercises) of the functional capacities of the respiratory pathogen surveillance systems, including their scalability and use of multisource surveillance to meet required surveillance objectives during a pandemic (see WHO's mosaic respiratory surveillance framework under the first action).

- ❑ **Foundational all-hazard actions** on surveillance (see Annex 1: A2.1).

2.2 Surveillance: early detection, investigation and assessment

- ❑ **Develop and implement methods (including trigger criteria), processes or mechanisms for early detection, biological sampling, verification, investigation and risk assessment of detected respiratory pathogen events** at a national, intermediate and primary public health level. Implementation should include health facility and community components and involve trained personnel from human, agricultural and environmental sectors.

> "Crafting the mosaic": a framework for resilient surveillance for respiratory viruses of epidemic and pandemic potential. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366689, accessed 14 June 2023) and associated virtual repository of existing supporting surveillance guidance and tools (accessed 20 July 2023).

- ❑ **Establish multidisciplinary (e.g. epidemiology, laboratory, clinical, RCCE, animal health, environment) rapid response teams** at a national, and then subnational, level to investigate respiratory pathogen events, including:
  - terms of reference;
  - a roster of deployable team members that have appropriate capacities (including respiratory disease expertise where applicable) and training, including in pandemic preparedness planning and response; and
  - guidelines and equipment (including PPE) for deployment.

> Protocol to investigate non-seasonal influenza and other emerging acute respiratory diseases. Geneva: World Health Organization; 2018 https://apps.who.int/iris/handle/10665/275657, accessed 14 June 2023).

- ❑ **Develop and exercise bilateral or regional surveillance and response agreements** with neighbouring countries on respiratory pathogen pandemics, for example timely reporting and sharing of information and joint risk assessment, investigation and response.

- ❑ **Establish mechanisms to review, adapt and disseminate case definitions** for suspected, confirmed, imported and locally transmitted cases of a pandemic respiratory pathogen based on the WHO case definition. Global guidance will be issued by WHO and can be adapted for local use based on surveillance and outbreak investigation findings.

- ❑ **Develop surveillance plans and strategies to detect animal to human spillover and further cases of human-to-human transmission of a pandemic respiratory pathogen,** including:
  - enhancing or adapting existing surveillance systems and strategies to collect and report pandemic cases and contact data in the emergence/introduction period (see section 2.3 for investigations and studies);
  - linking case and contact detection and the resulting risk assessment in range of settings to rapid and appropriate clinical management (see Chapter 4 on clinical care);
  - linking case and contact detection and the resulting risk assessment to appropriate proportional public health response (see section 3.1 on PHSM).

- ❑ **Foundational all-hazard actions** on surveillance (see Annex 1: A2.2).

2.3 Surveillance: monitoring circulating pathogens and use of human health interventions

- ❑ **Develop or enhance routine capacity for real-time analytic epidemiology (i.e. automated analysis and visualization of data as soon as it enters the system) of respiratory pathogens**, ideally using available multiple sources information, including aggregate and case-based data.

- ❑ **Where feasible, ensure multiple respiratory pathogens (e.g. influenza viruses, SARS-CoV-2, RSV, MERS-CoV) are integrated within sentinel influenza-like illness (ILI)/acute respiratory illness (ARI)/severe acute respiratory infection (SARI) and other indicator-based surveillance systems**, depending on national public health priorities: both epidemiological aspects and multi-pathogen laboratory testing.

- ❑ **Develop preparedness plans and strategies to maintain, assess and adapt (i.e. scale up and scale down) core surveillance approaches** according to national priority surveillance objectives during different pandemic scenarios (i.e. depending on reproductive rate or predominant mode of transmission; including when capacities are stretched and health seeking behaviour may change) in order to:
  - switch between comprehensive case-based reporting and monitoring for trends;
  - switch between lab confirmation of all cases and confirmation of a representative sample of cases (e.g. to case-based ILI/ARI/SARI sentinel surveillance);
  - monitor disease severity, mortality and clinical outcomes;
  - estimate the burden of the disease;
  - monitor respiratory pathogen characteristics over time, including viral changes, antimicrobial resistance (AMR) and impact on/reduced efficiency of different countermeasures (vaccines, therapeutics and diagnostic tests);
  - identify the most vulnerable, marginalized (see PRET Module 1: Box 4) and high-risk groups or settings for targeted interventions;
  - monitor the impact on the health care system (access and use);
  - ensure data is shared to evaluate uptake and effectiveness of different interventions to inform improvement of clinical care, medical countermeasures and adjustment of PHSM (see section 3.1 on PHSM); and
  - monitor at the animal–human interface for potential spill-back.

"Crafting the mosaic": a framework for resilient surveillance for respiratory viruses of epidemic and pandemic potential. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366689, accessed 14 June 2023) and associated virtual repository of existing supporting surveillance guidance and tools [pdf] (accessed 20 July 2023).

WHO guidance for surveillance during an influenza pandemic, 2017 update. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/259886, accessed 14 June 2023) (updated version to be published in 2024).

Public health surveillance for COVID-19: interim guidance, 22 July 2022. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/360580, accessed 14 June 2023).

- ❑ **Establish SOPs and enhance capacities for conducting systematic and regular pandemic risk and severity assessments** (including for seasonal epidemics) for priority respiratory pathogens at the national and subnational level (for pandemic influenza severity assessment (PISA), see Box 1), including:
  - risk prioritization, risk calendar, enunciation of population vulnerabilities and system capacities using the Strategic Toolkit for Assessing Risks (STAR) approach;
  - multisource parameters to assess indicators of seasonal and pandemic severity (transmissibility, seriousness of disease and impact) using the PISA approach (see Box 1);
  - baselines and thresholds or defined ranges for each parameter using historical data;
  - mechanisms to review the risk and severity assessment tools, proportional control measures, public health interventions and pandemic response plans based on findings;
  - mechanisms to communicate assessment results to national authorities and WHO;
  - mechanisms to communicate assessment results to affected populations (through links with risk communication specialists) (see section 3.4 on risk communication and community engagement); and mechanisms to ensure assessment results are used for tailored implementation of PHSM and other interventions (see section 3.1 on PHSM).

Strategic toolkit for assessing risks: a comprehensive toolkit for all-hazards health emergency risk assessment. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/348763, accessed 14 June 2023).

- ❑ **Ensure draft protocols and mechanisms, including for ethical clearance and data and virus/sample sharing, are in place to allow for fast-tracked, quality investigation and studies ("Unity Studies")** to assess the risk of emerging respiratory pathogens such as influenza viruses, SARS-CoV-2 (COVID-19) and MERS-CoV.

- ❑ **Foundational all-hazard actions** on surveillance (see Annex 1: A2.3).

See WHO webpages: Influenza Investigations & Studies, SARS-CoV-2 (COVID-19) investigations and studies, MERS-CoV outbreak toolkit and respiratory pathogen investigations and studies (accessed 14 June 2023).

2.4 Laboratory

- ❑ **Maintain or establish national capacity to collect and perform reliable and timely detection, reporting and sharing** of samples of priority respiratory pathogens with pandemic potential (e.g. influenza viruses, SARS-CoV-2 and MERS-CoV; see PRET Module 1: section 3.4 and Table 2), including through referral if such testing capacity is unavailable locally. Use protocols and procedures developed in collaboration with WHO and access available laboratory reagents and consumables (e.g. via International Reagent Resource).

  Manual for the laboratory diagnosis and virological surveillance of influenza. Geneva: World Health Organization; 2011 (https://apps.who.int/iris/handle/10665/44518, accessed 12 June 2023).

  Laboratory testing for Middle East respiratory syndrome coronavirus: interim guidance (revised), January 2018. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/259952, accessed 12 June 2023).

  See WHO webpage: Country & Technical Guidance – Coronavirus disease (COVID-19) (accessed 12 June 2023) and US-CDC's International Reagent Resource website (accessed 5 September 2023).

- ❑ **Ensure mechanisms to develop or have access to sensitive and specific molecular and serological diagnostic assays are in place** for future emerging pandemic respiratory pathogens.

- ❑ **Ensure access to designated WHO Collaborating Centres or reference laboratories for confirmation, advanced characterization, antiviral susceptibility properties, risk assessment, research** on priority pandemic respiratory pathogens and as repositories for research and candidate vaccine viruses, as applicable. Participate in Expanded GISRS, CoViNet and/or the WHO BioHub system, including the routine sharing of viruses and associated meta data internationally and between laboratories in the animal and human health sectors. (See also section 2.1 on overarching system considerations for surveillance and Box 1.)

  See WHO webpages: Global Influenza Surveillance and Response System (GISRS), Call for expression of interest for reference laboratories of the WHO CoViNet, Terms of Reference for WHO reference laboratories providing confirmatory testing for COVID-19 (basis for the WHO Global Coronavirus Laboratory Network (CoViNet), and WHO BioHub System (accessed 12 June 2023).

- ❑ **Develop, cost and sustain wherever possible (those established or enhanced for SARS-CoV-2) genomic sequencing and bioinformatics capacities** at the national and/or subnational level for respiratory pathogen characterization, and participate in global genomic and antigenic characterization systems.

  Global genomic surveillance strategy for pathogens with pandemic and epidemic potential, 2022–2032. World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/352580, accessed 12 June 2023).

- ❑ **Develop or update national testing strategies for priority respiratory pathogens (e.g. influenza viruses, SARS-CoV-2, MERS-CoV) during different pandemic periods** (see PRET Module 1: Chapter 4 and Fig. 4) and with clear links to defined public health interventions that cover:
  - plans for surge capacity;
  - prioritization of samples for testing, particularly when resources are constrained;
  - specific diagnostic algorithm(s) adapted to the local context (based on national surveillance objectives for each pandemic period (see PRET Module 1: Chapter 4 and Fig. 4) and level of available resources that can be adjusted according to different patterns of transmission;
  - diagnostic assay assessment, selection and procurement in close collaboration with the regulatory sector and relevant WHO guidance (according to setting, market accessibility and validation studies of new assays), including in-house assays at the national level or self-testing and point-of-care (POC) diagnostics and linkages with potential clinical actions (e.g. test and treat), where relevant;
  - sustaining and adapting sampling strategies during different pandemic periods and patterns of transmission (see PRET Module 1: Chapter 4 and Fig. 4), including criteria for selecting specimens to undergo further analysis and full genome sequencing for characterization.
  - managing respiratory pathogens according to laboratory biosafety standards;
  - participating in or establishing external quality assurance programme processes;
  - timely submission of sequence data to publicly accessible databases (e.g. GenBank, Global Initiative on Sharing All Influenza Data (GISAID));
  - a communication plan for stakeholders and communities; and
  - linkage between national laboratory data systems (e.g. laboratory Information management systems (LIMS)) and national clinical and epidemiological data systems, as well as other systems as appropriate.

Laboratory biosafety manual, 4th ed. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/337956, accessed 12 June 2023).

Outbreak preparedness and resilience. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/337959, accessed 12 June 2023).

See webpages: GenBank, GISAID (accessed 12 June 2023).

- ❑ **Foundational all-hazard actions** on laboratory (see Annex 1: A2.4).

2.5 One Health/zoonotic disease: collaborative efforts

- ❑ **Establish or strengthen clear and coordinated mechanisms (including reporting formats and channels) for consistent, timely and systematic data and information exchange** arising from preparedness or response to potential zoonotic respiratory disease events between different sectors.

- ❑ **Identify and establish pathways to conduct joint risk assessments and outbreak investigation** at the animal–human interface of potential zoonotic respiratory disease events, both routinely and during emergencies, to inform appropriate and proportional action.

- ❑ **Enhance and co-ordinate virological and epidemiological surveillance across the human, animal and environmental health sectors** to detect, assess and investigate respiratory pathogen events (e.g. unusual cases/clusters of ILI or deaths) including identifying potential animal sources of human infection and assessing the risk of human-to-human transmission.

Surveillance and information sharing operational tool: an operational tool of the Tripartite zoonoses guide. Geneva: World Health Organization, Food and Agriculture Organization of the United Nations & World Organisation for Animal Health; 2022 (https://apps.who.int/iris/handle/10665/361443, accessed 12 June 2023).

Joint risk assessment operational tool (JRA OT): an operational tool of the tripartite zoonoses guide: taking a multisectoral, one health approach: a tripartite guide to addressing zoonotic diseases in countries. Geneva: World Health Organization, Food and Agriculture Organization of the United Nations & World Organisation for Animal Health; 2020 (https://apps.who.int/iris/handle/10665/340005, accessed 12 June 2023).

See webpage: Tripartite Zoonoses Guide (accessed 12 June 2023).

- ❑ **Foundational all-hazard actions** on One Health/zoonotic disease (see Annex 1: A2.5).

BOX 1. Pathogen-specific actions for collaborative surveillance

Influenza viruses

❑ **Actively participate in GISRS and Expanded GISRS** (see sections 2.1 and 2.4).

See WHO webpage: Global Influenza Surveillance and Response System (GISRS) (accessed 12 June 2023).

Global epidemiological surveillance standards for influenza. Geneva: World Health Organization; 2013 (https://apps.who.int/iris/handle/10665/311268, accessed 20 July 2023).

❑ **Develop or update a policy to share biological materials (e.g. viruses and/or clinical specimens) internationally in a timely and systematic manner**, in line with the PIP Framework virus-sharing and benefit-sharing system, including:

- sharing biological materials (including clinical specimens) from confirmed pandemic influenza cases internationally;
- sharing influenza viruses with human pandemic potential with a WHO Collaborating Centre on Influenza or a WHO H5 Reference Laboratory of the originating Member State's choice;
- sharing genetic sequence data, and analyses related to the shared virus material, with the originating laboratory and among WHO GISRS laboratories (or via public domain or public access databases); and
- addressing material transfer agreements, distribution of viral isolates and RNA, sequencing results and other relevant laboratory data (e.g. antigenic features and antiviral drug resistance).

See WHO webpages: Pandemic Influenza Preparedness (PIP) Framework and Standard Material Transfer Agreements (SMTA2) benefit sharing mechanisms (accessed 12 June 2023).

Operational guidance on sharing influenza viruses with human pandemic potential (IVPP) under the pandemic influenza preparedness (PIP) framework. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/259402, accessed 12 June 2023).

Pandemic influenza preparedness framework for the sharing of influenza viruses and access to vaccines and other benefits, 2nd ed. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/341850, accessed 12 June 2023).

❑ **Identify parameters to assess indicators of pandemic influenza severity** (transmissibility, seriousness of disease and impact) using the WHO PISA framework and implement severity assessments for seasonal influenza epidemics in advance of a pandemic.

BOX 1. Pathogen-specific actions for collaborative surveillance

Pandemic influenza severity assessment (PISA): a WHO guide to assess the severity of influenza in seasonal epidemics and pandemics. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/259392, accessed 12 June 2023).

- ❑ **Assess risk of influenza viruses with pandemic potential to inform cross-sectoral actions.** Consider adaptation of the WHO's Tool for Influenza Pandemic Risk Assessment (TIPRA) by adjusting it to national context to ensure reliable results as the tool is currently designed for global risk assessment.

Tool for Influenza Pandemic Risk Assessment (TIPRA). Geneva: World Health Organization; 2016 (https://www.who.int/publications/i/item/tool-for-influenza-pandemic-risk-assessment-(tipra)-2nd-edition, accessed 12 June 2023).

- ❑ **For countries without a NIC, identify and designate an appropriate public health laboratory** to collaborate and seek support from WHO Collaborating Centres, and build capacity to meet the terms of reference for WHO-recognized NICs and obtain recognition as a NIC.

See WHO webpage: National Influenza Centres (accessed 12 June 2023).

MERS-CoV (for relevant countries, i.e. experience with outbreaks or in which MERS-CoV is known or suspected to be circulating in camel populations, for cases with relevant travel history):

- ❑ **Countries in which MERS-CoV is known or suspected to be circulating in camel populations should conduct targeted studies** to identify the extent of human exposure in communities at risk and establish access to an international reference laboratory or designated WHO Collaborating Centre for MERS-CoV confirmatory testing and advanced analysis.

See WHO webpage: MERS Outbreak Toolbox (accessed 12 June 2023).

- ❑ **Develop or update a diagnostic testing algorithm that investigates any suspect MERS-CoV human case (based on history) or influenza-negative cases** of respiratory infection for MERS-CoV.

- ❑ Given the relative lack of MERS-CoV sequence information available for analysis and risk assessment, **any MERS-CoV virologically positive specimen should undergo full genome sequencing and genetic sequence data, and analyses arising from that data** should be shared in a timely manner with the international community (e.g. via public domain or public access databases).

BOX 1. Pathogen-specific actions for collaborative surveillance

SARS-CoV-2 (COVID-19)

- ❑ **Participate in global surveillance and laboratory networks** such as Expanded GISRS, CoViNet and the WHO BioHub System (see sections 2.1 and 2.4).
- ❑ **Follow the latest WHO surveillance guidance for SARS-CoV-2** (COVID-19)

Public health surveillance for COVID-19: interim guidance, 22 July 2022. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/360580, accessed 12 June 2023).

- ❑ **Develop or update, and implement, SARS-CoV-2 risk assessment tools for use at the national level**, taking into account global and regional risk assessments.

COVID-19: coronavirus disease 2019; CoViNet: Global Coronavirus Laboratory Network; GISRS: Global Influenza Surveillance and Response System; MERS-CoV: Middle East respiratory syndrome coronavirus; NIC: National Influenza Centre; PISA: Pandemic Influenza Severity Assessment; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; WHO: World Health Organization.

3 Community protection (See PRET Module 1: section 5.3)

3.1 Public health and social measures: overarching

- ❑ **Invest in and implement improved indoor air quality** to reduce the risk of respiratory pathogen transmission in indoor spaces – be it in health facilities, public spaces or households.

See WHO webpage: Air quality and health (accessed 12 June 2023).

- ❑ **Develop draft PHSM implementation procedures and protocols based on the latest science and lessons identified** for priority respiratory pathogens of pandemic potential, including use of risk–benefit analyses and defining the public health rationale, indicators, trigger criteria and thresholds. To consider:
  - leadership and governance of PHSM (multisector, all levels);
  - fostering partnerships (in a culturally appropriate and empathetic way) and ownership of trusted influential community leaders (including religious leaders, faith-based organizations and faith communities), networks, groups and other influencers at the national and local level, including communities (see also section 3.4 on RCCE);

- using a risk-based approach, encompassing the hazards (considering commonalities and specificities of priority respiratory pathogens), vulnerabilities and capacities, to support implementation and adjustment (scale up or scale down) and lifting of PHSM. This should include the use of surveillance and outbreak investigation and study findings (e.g. transmissibility, health care capacity monitoring, severity and impact assessments) as well as available behavioural and social science findings;
- protecting vulnerable and marginalized populations (see PRET Module 1: Box 4) (particularly in countries experiencing humanitarian crises and/or conflict) in the decision to implement, maintain or lift PHSM;
- leveraging and transitioning between seasonal/routine and pandemic PHSM (e.g. for influenza viruses and SARS-CoV-2); and developing pathogen-specific PHSM for priority respiratory pathogens of pandemic potential.

See WHO webpage: Measuring the effectiveness and impact of public health and social measures (accessed 12 June 2023).

Considerations for implementing and adjusting public health and social measures in the context of COVID-19: interim guidance, 30 March 2023. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366669, accessed 12 June 2023).

World Health Organization strategy for engaging religious leaders, faith-based organizations and faith communities in health emergencies. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/347871, accessed 12 June 2023).

❑ **Engage with, and develop networks and mechanisms, with relevant multisectoral stakeholders (see PRET Module 1: Box 3 and Annex 2) that could support social protection policies and other mitigation measures** (i.e. basic income security, food security, secure housing, access to mental health services), to reduce unintended negative consequences and ensure equitable implementation of PHSM for respiratory pathogens. Ensure the unique challenges faced by vulnerable and marginalized populations (see PRET Module 1: Box 4) are accounted for, particularly in countries experiencing humanitarian crises and /or conflict.

❑ **Establish mechanisms to monitor and gauge PHSM adherence during respiratory pathogen outbreaks, seasonal epidemics and pandemics**, for example through household or community surveys and other research to inform PHSM implementation design.

See WHO webpage: Measuring the effectiveness and impact of public health and social measures (accessed 12 June 2023).

- ❑ **Develop mechanisms to predict and assess unintended negative consequences of PHSM implemented in response to respiratory pathogen outbreaks** (including mental health, increased care burden, social inequity, slowing of educational attainment), for example in relation to (i) closing childcare facilities and educational institutions (e.g. schools and universities) and (ii) implementing travel measures.

- ❑ **Foundational all-hazard actions** on PHSM (see Annex 1: A3.1).

3.2 Public health and social measures: community

- ❑ **Encourage childcare facilities, educational institutions and workplaces to develop respiratory pathogen pandemic preparedness plans, including implementation of PHSM** (e.g. physical distancing, mask usage, self-testing, ventilation, infection control) and business continuity plans for closures, teleworking and shortages in staffing, as part of health emergency management plans.

WHO guidance for business continuity planning. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/324850, accessed 20 July 2023).

- ❑ **Identify types of mass gathering events that may need to be modified or suspended** (e.g. sport events, festivals and markets) under different respiratory pathogen pandemic scenarios (i.e. depending on reproductive rate or predominant mode of transmission). Develop strategies and criteria for application of PHSM with event organizers and other partners to make events safer.

See WHO webpage: WHO's managing health risks during mass gatherings (accessed 12 June 2023)

- ❑ **Update recommendations and guidance for the community** (e.g. in community-level primary care facilities, including quarantine and isolation centres) **and home care of persons with respiratory disease and infection prevention among their household members** (e.g. hand hygiene, mask use, respiratory etiquette, cleaning touched surfaces and items frequently, recognizing symptoms, and when and where to seek care, online training for care).

See WHO webpage: Health emergencies – infection prevention and control. (accessed 12 June 2023).

- ❑ **Engage and support civil society organizations, including community- and faith-based organizations, and community HCWs** in developing PHSM strategies, plans and guidance, as they are best positioned to reach vulnerable populations (see PRET Module 1: Box 4) and improve public trust in health institutions.

World Health Organization strategy for engaging religious leaders, faith-based organizations and faith communities in health emergencies. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/347871, accessed 12 June 2023).

See WHO webpage: Measuring the effectiveness and impact of public health and social measures (accessed 12 June 2023).

- ❑ **Foundational all-hazard actions** on PHSM (see Annex 1: A3.2).

3.3 Points of entry and border health

- ❑ **Create linkages with the national surveillance system to support risk assessment and implementation, calibration or lifting of travel-related measures during respiratory pathogen pandemics, using information from multiple sources (see PRET Module1: Annex 4 for administrative data that may provide context for decision making).** Map and periodically update information on travel and trade connections across adjacent communities and in between travel/trade hubs to be able to inform timely risk assessments.

- ❑ **Update public health emergency contingency plans at designated points of entry (PoE)** and ensure that they are coherent with the national respiratory pathogen pandemic preparedness plans. Include SOPs for providing public health advice to travellers, conducting surveillance and case management, IPC practice (e.g. cleaning and disinfection at PoE and conveyances) and allowing for the safe maintenance of essential travel and transport of essential supplies.

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International health regulations (2005): a guide for public health emergency contingency planning at designated points of entry. Geneva: World Health Organization; 2012 (https://apps.who.int/iris/handle/10665/206918, accessed 20 July 2023).

See WHO webpage: Minimizing health risks at airports, ports and ground crossings (accessed 20 July 2023).

- ❑ **Ensure that staff are trained and equipped to detect, manage and, where required, transport travellers** with suspected pandemic respiratory pathogen infection to appropriate medical facilities, and to identify and manage their contacts. Establish mechanisms to mobilize surge staff if necessary.

- ❑ **Identify facilities and resources to safely assess, isolate and treat arriving travellers or staff, and animals** (poultry, livestock, wild animals), with pandemic respiratory pathogen symptoms or signs. This should include:
  - identifying facilities at PoE to safely and rapidly assess and isolate arriving travellers or staff, and animals;
  - establishing arrangements with referral hospitals and quarantine facilities for the further assessment and treatment of suspected travellers or staff; and
  - establishing arrangements with veterinary facilities for the assessment and care of suspected animals with pandemic respiratory pathogen symptoms or signs.

- ❑ **Coordinate with public health authorities to develop or update appropriate draft pandemic respiratory pathogen risk communication messages** on risk mitigation measures for travellers, staff and crew (see also section 3.4 on RCCE below).

- ❑ **Foundational all-hazard actions** on border health and PoE (see Annex 1: A3.3).

3.4 Risk communication and community engagement

- ❑ **Co-develop and implement RCCE strategies, plans and resources for acute respiratory disease events** (including for seasonal and zoonotic influenza, and MERS cases) through fostering partnerships at different levels (from national to community) and from different sectors (including a One Health approach) to inform and empower people to adopt behavioural changes to protect their health (see sections 3.1 and 3.2 on PHSM), including:
  - accounting for different local cultural and geographical contexts, local language and communication channels, enablers and barriers to promote adherence to public health messages and PHSM;
  - pre-testing messages through a participatory process, specifically targeting key stakeholders and vulnerable/marginalized/at-risk groups;
  - equipping community leaders with skills to deliver accurate health messages to their communities; and
  - leveraging and transitioning between seasonal/routine to epidemic and pandemic RCCE (e.g. for influenza viruses and COVID-19).

See webpages: the Collective Service (accessed 12 June 2023).

WHO community engagement framework for quality, people-centred and resilient health services. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/259280, accessed 12 June 2023).

- ❑ **Strengthen scientific literacy and people's understanding of evidence about respiratory pathogens and pandemics** through community dialogue, integration into educational curricula and utilizing networks, media, updated online content (including myth-busting pages), social media and other appropriate technology.

See WHO webpage: Translating science for better health emergency preparedness (accessed 12 June 2023).

- ❑ **Identify and train a public communication unit and experts to be respiratory pathogen pandemic spokespeople, including a surge mechanism for response.** Ensure that this team can conduct proactive public outreach on a mix of social and traditional media platforms, using locally relevant languages and technologies.

See WHO webpage: Emergency risk communication training (accessed 12 June 2023) and upcoming RCCE Capacity Building Platform.

- ❑ **Establish a routine social listening and infodemic management function, including for priority respiratory pathogens of pandemic potential and include outputs/analyses in routine public health surveillance bulletins**. This should provide routine rapid insights on circulating concerns, questions, information voids and circulating narratives, mis- and disinformation and narrative crossovers with other health topics or acute health events. This should include a trained infodemic workforce in the ministry of health for epidemics and pandemics.

See WHO webpages: Early AI-supported response with social listening for COVID-19, and Infodemic for guidance and tools, WHO training on infodemic management and OpenWHO.org Infodemic management 101 training (accessed 12 June 2023).

WHO competency framework: building a response workforce to manage infodemics. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/345207, accessed 12 June 2023).

- ❑ **Establish research capacity and conduct baseline surveys and mapping on social, behavioural, cultural and other data related to respiratory pathogen pandemic communications** for key target audiences, for example languages of preference, trusted channels of communication and information, education levels and cultural, religious and economic factors that may increase risk.

See WHO webpage: Behavioural Sciences for Better Health Initiative (accessed 12 June 2023).

- ❑ **Foundational all-hazard actions** on RCCE (see Annex 1: A3.4).

4 Clinical care (See PRET Module 1: section 5.4)

4.1 Health service provision: continuity of essential health services

- ❑ **Encourage development of facility-level plans for providing essential health services** including prevention, reproductive health, care of the vulnerable, continuity of critical inpatient care and management of acute presentations based on different respiratory pathogen pandemic scenarios.

- ❑ **Develop remote methods to triage and offer health care to non-emergency respiratory pathogen patients** (e.g. telephone or online consultations), while ensuring access to essential medicines and supplies.

- ❑ **Develop plans to maintain essential public health services during a respiratory pathogen pandemic, including mechanisms to rapidly map and identify resource requirements and then to mobilise and add appropriate technical and operational resources to deliver these services.** Consider concurrent outbreak response, routine vaccination programmes and screening for priority diseases such as tuberculosis.

- ❑ **Develop policies and plans to implement and sustain vaccination programmes for seasonal influenza, COVID-19** and other priority diseases to prevent morbidity and mortality (see Box 3).

See WHO webpage: Essential Programme on Immunization (accessed 12 June 2023).

- ❑ **Establish mechanisms and protocols to govern essential health service delivery in coordination with respiratory pathogen response protocols.**

- ❑ **Foundational all-hazard actions** on health service provision: continuity of essential health services (see Annex 1: A4.1).

4.2 Health service provision: case management

- ❑ **Apply available clinical care readiness tools to evaluate clinical functionality and enable the development and implementation of well-designed national health service packages relevant to respiratory pathogen pandemic preparedness,** including the identification of essential functions and the resources required to deliver these functions. The tools include:
  - **Core Clinical Care Readiness (C3R) planning tool for high-risk respiratory pathogens: an operational online tool** designed to help health systems deliver vital services through a structured assessment and prioritized action plan for key clinical pathways.
  - **Universal Health Coverage (UHC) Service Package Delivery & Implementation (SPDI) Tool,** specifically clinical care readiness packages and specific interventions for lower respiratory infections. SPDI is powered by the UHC Compendium of Health Interventions, and provides detailed data on health products, workforce, and references. It supports strategic shifts to ensure effective emergency response and safe delivery of essential health services during emergencies.

See WHO webpage: WHO Partner's Platform (for C3R tool, high-risk respiratory pathogen C3R tool to be launched later in 2023), Universal Health Coverage Service Package Delivery & Implementation Tool, WHO Emergency Care Website (accessed 5 September 2023).

- ❑ **Conduct mapping of public and private health facilities**, and alternate facilities (e.g. schools, community halls, military barracks) for:
  - **acute respiratory pathogen pandemic patients,** including level of care that can feasibly and safely be offered, number of beds, isolation and intensive care capacity, mortuary capacity and mechanisms for continuity of care of patients (e.g. transfer, bed tracking, centralized patient distribution); and
  - **chronic and long-term care of respiratory pathogen pandemic patients**: include community-based health care (including traditional healers, pharmacies and other providers) and outreach, including level of care that can feasibly and safely be offered and access to routine diagnostic and treatment services.

Clinical care for severe acute respiratory infection: toolkit: COVID-19 adaptation, update 2022. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/352851, accessed 12 June 2023).

Severe acute respiratory infections treatment centre: practical manual to set up and manage a SARI treatment centre and a SARI screening facility in health care facilities. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/331603, accessed 12 June 2023).

- ❑ **Develop or adapt, and develop mechanisms to rapidly distribute and implement, evidence-based clinical management guidelines for patients with suspected or confirmed infection** with priority respiratory pathogens of pandemic potential, based on international standards and WHO clinical guidance and tools (see Box 2 for pathogen-specific actions and guidance) according to local context, addressing:
  - where patients with mild, moderate, severe and critical respiratory disease should be managed (i.e. level of care, and community or hospital setting);
  - screening, management and treatment of potentially infectious patients in the community, including self-care of patients with mild symptoms and when referral to a health facility is recommended;
  - screening, triage, admission criteria and management of potentially infectious patients in hospitals;
  - mechanisms to identify patients who require more careful monitoring;
  - treatment protocols and clinical care pathways for specific diseases (see Box 2), including antiviral drugs (when applicable), antibiotics, other specific therapeutics (when applicable), ventilation (including assessment and readiness for oxygen requirements), supportive treatment and treatment for secondary infections;
  - prioritization of medical treatment in identified groups (e.g. severe cases, children, HCWs and patients with higher chances of survival) for when resources are constrained;
  - IPC protocols for HCWs and caregivers (see also section 4.3 on IPC);
  - specimen collection and transport;
  - criteria for laboratory testing, including access to and use of POC tests where appropriate; and
  - surveillance and response, including reporting of clinically confirmed and laboratory confirmed cases to public health surveillance systems, contact tracing, data collection and community engagement.

Clinical care for severe acute respiratory infection: toolkit: COVID-19 adaptation, update 2022. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/352851, accessed 12 June 2023).

- ❑ **Develop and implement training resources for priority respiratory pathogens of pandemic potential to update multidisciplinary HCWs (including doctors, nurses, technicians, biomedical engineers and others), and develop tools to evaluate the training level of staff**, regarding the use of guidelines, medicines, supplies and medical devices.

See webpages: WHO's Health workforce education and training website, Open WHO Clinical management channel, European Society of Intensive Care Medicine e-learning platform and Global Health Workforce Network Education Hub (accessed 12 June 2023).

- ❑ **Address gaps in respiratory care service provision**, for example scale up of oxygen.

See WHO webpage: Medicinal oxygen (accessed 12 June 2023).

- ❑ **Develop country-specific protocols and mechanisms (see also Chapter 2 on collaborative surveillance) to enable health facilities to participate in respiratory pathogen investigations and studies, including operational research.** Share the results routinely to WHO global platforms, for example Expanded GISRS, WHO global clinical platforms, respiratory investigations and studies:
  - of early cases and other cases (e.g. dead cases, unusual presentations, HCWs);
  - to inform treatment (including monitoring adverse events efficacy, effectiveness, resistance, impact, coverage, acceptance and safety); and
  - to inform standard of care.

See WHO webpages: Global Influenza Surveillance and Response System (GISRS), WHO Global Clinical Platform, Respiratory Investigations & Studies (Unity Studies) (accessed 12 June 2023).

- ❑ **Foundational all-hazard actions** on health service provision: case management (see Annex 1: A4.2).

4.3 Infection prevention and control

- ❑ **Routinely convene a national IPC taskforce on respiratory pathogens to revise, adapt, disseminate and implement existing IPC guidelines and protocols**. This includes an IPC focal point, defined patient-referral pathway and implementation of IPC measures, to allow hygienic health service environments and care delivery with adequate supplies, health care waste management and water, sanitation and hygiene (WASH), as well as appropriate administrative and engineering controls. This applies to all health care facilities across all levels of the health system, including in public and private:

- primary, secondary and tertiary care, including hospitals and ambulatory/out-patient care;
- temporary facilities used as part of pandemic emergency measures;
- ambulance services and emergency services in the community;
- community-based health care or outreach (including traditional healers/practices, pharmacies, and other providers);
- long-term care facilities; and
- clinical laboratories.

See webpages: WHO's Health emergencies – infection prevention and control, the WHO Global IPC portal and the WASH FIT portal (accessed 12 June 2023).

❑ **Develop or update a plan and case definition for routine surveillance, reporting and monitoring of health-care-associated infections** where exposures resulting in respiratory illness occurred in a health service setting. Accompany this plan with follow-up actions to take place when detected (e.g. case/cluster/outbreak investigation and mitigation protocols, targeted quality improvement planning to reduce further transmission risk; see also Chapter 2 on collaborative surveillance).

❑ **Establish or strengthen PPE availability and quality control in health facilities** for use during routine care and seasonal epidemics of respiratory pathogens, as well as for surge needs during a pandemic (see also Chapter 5 on access to countermeasures).

❑ **Develop core actions to be taken in the context of surges in respiratory pathogen cases**, including where an excess number of cases present to health services beyond current limitations for clinical care and occupancy, including:

- in collaboration with logistics, developing a budgeted national plan to manage IPC supplies (stockpile, distribution, quality assurance, dynamic inventories/rotating stock);
- identifying IPC human resource surge capacity (personnel numbers and IPC core competencies); and
- including strategies for appropriate and rational use of PPE in all health and community settings, in collaboration with partners as required (see also section 5.3 on essential medicines, products and materials).

Core competencies for infection prevention and control professionals. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/335821, accessed 12 June 2023).

Framework and toolkit for infection prevention and control in outbreak preparedness, readiness and response at the national level. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/345251, accessed 12 June 2023).

Framework and toolkit for infection prevention and control in outbreak preparedness, readiness and response at the health care facility level. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/361522, accessed 12 June 2023).

- ❑ **Develop or update plans for HCWs exposed to confirmed respiratory pathogen pandemic cases**, including screening, exposure risk assessment in health facilities and quarantine criteria, testing (where appropriate) and isolation.

- ❑ **Foundational all-hazard actions** on IPC (see Annex 1: A4.3).

4.4 Safe management of a dead body

- ❑ **Develop or update mortuary plans/preparedness plans to manage increased numbers of bodies** due to respiratory pathogen pandemic deaths, including postmortem care of corpses. Identify resources and alternative sites for emergency mortuary facilities.

- ❑ **Foundational all-hazard actions** on safe management of a dead body (see Annex 1: A4.4).

BOX 2. Pathogen-specific priority actions for clinical care

Influenza viruses

- ❑ **Develop or adapt evidence-based clinical management guidelines, including treatment protocols and clinical care pathways for patients with suspected or confirmed influenza virus infection with or at risk of severe illness**[a] according to recent WHO guidelines for the clinical management of severe influenza virus infections, including:
  - treatment with antivirals, and
  - use of diagnostic testing strategies to guide treatment of patients with or at risk of severe influenza virus infection (i.e. to test and then immediately treat when RT-PCR (reverse transcription polymerase chain reaction) or other rapid and well-performing molecular influenza assays are available, and re-evaluating treatment when the test result is available).

Guidelines for the clinical management of severe illness from influenza virus infections. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/352453, accessed 12 June 2023).

MERS-CoV

- ❑ **Develop or adapt evidence-based clinical management guidelines, including treatment protocols and clinical care pathways for patients with suspected or confirmed MERS-CoV** according to recent WHO MERS clinical management guidance.

Clinical management of severe acute respiratory infection when Middle East respiratory syndrome coronavirus (MERS-CoV) infection is suspected: interim guidance. Geneva: World Health Organization; 2019 (https://apps.who.int/iris/handle/10665/178529, accessed 12 June 2023).

- ❑ **Revise, adapt and disseminate IPC guidelines and protocols** for during health care for probable or confirmed cases of MERS-CoV infection.

[a] For people at greater risk for severe illness or complications, see table 1.1 in the WHO guidelines for clinical management of severe illness from influenza virus infections.

BOX 2. Pathogen-specific priority actions for clinical care

Infection prevention and control during health care for probable or confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection: interim guidance: updated October 2019. Geneva: World Health Organization; 2019 (https://apps.who.int/iris/handle/10665/174652, accessed 12 June 2023).

SARS-CoV-2 (COVID-19)

❑ **Develop or adapt evidence-based clinical management guidelines**, including treatment protocols and clinical care pathways for patients with suspected or confirmed SARS-CoV-2 according to recent WHO guidelines.

See WHO webpages: Clinical management of COVID-19: living guideline, Therapeutics and COVID-19: living guideline and Drugs to prevent COVID-19: living guideline (accessed 12 June 2023). See also Clinical management of COVID-19 (accessed 12 June 2023).

❑ **Revise, adapt, disseminate and implement IPC guidelines and protocols** in the context of COVID-19 according to WHO living guidance.

See WHO webpage: Infection prevention and control in the context of coronavirus disease (COVID-19): a living guideline,13 January 2023, accessed 12 June 2023).

COVID-19: coronavirus disease 2019; IPC: infection prevention and control; RT-PCR: reverse transcription polymerase chain reaction; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; WHO: World Health Organization.

5 Access to countermeasures (See PRET Module 1: section 5.5)

5.1 Health emergency response: emergency logistics and supply chain management

- ❑ **Establish or strengthen robust regulatory systems/pathways (including legal provisions and national staff expertise)** to expedite the importation (as required), marketing authorization, licensing and distribution, and post-market surveillance of newly developed or newly essential medicines, products and materials[1] for priority respiratory pathogens of pandemic potential.

  See WHO webpage: Regulation and prequalification (accessed 12 June 2023).

- ❑ **Review supply chain control and management systems** (stockpiling, storage, security, transportation and distribution arrangements) for essential medicines, products and materials[1] for priority respiratory pathogens of pandemic potential. Strengthen or establish linkages to supply chains and delivery.

- ❑ **Develop or strengthen capacity for post-market oversight of medical countermeasures** for priority respiratory pathogens of pandemic potential, including pharmacovigilance systems during the interpandemic period.

- ❑ **Foundational all-hazard actions** on health emergency response: emergency logistics and supply chain management (see Annex 1: A5.1).

  See WHO webpage: Disease Commodity Packages (accessed 20 July 2023).

  Foundations of medical oxygen systems, 17 February 2023. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366149, accessed 12 June 2023).

  Priority medical devices list for the COVID-19 response and associated technical specifications: interim guidance, 19 November 2020. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/336745, Accessed 12 June 2023).

  Biomedical equipment for COVID-19 case management: inventory tool: harmonized health service capacity assessments in the context of the COVID-19 pandemic: interim guidance, 25 June 2020. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/332777, accessed 12 June 2023).

[1] **Essential medicines, products and materials necessary for the response to maintain essential health services and for priority respiratory pathogens** include: emergency kits, PPE, diagnostics, medical consumables, medical devices, therapeutics, medicines (including antivirals for treatment and prophylaxis, antibiotics) and biomedical equipment (hydration, oxygen and ventilation support), and pandemic vaccines. See also WHO's Disease Commodity Packages, which are available for pandemic influenza, COVID-19 and MERS, among other diseases.

5.2 Equitable access, needs-based allocation and medical countermeasures deployment for pandemic products such as vaccines and antivirals – NDVP planning

- ❑ **Update or develop a national deployment and vaccination plan (NDVP) that addresses actions needed during a respiratory pathogen pandemic**, according to the latest WHO 2023 NDVP guidance and based on existing routine immunization capacities and lessons learned from COVID-19 and other experiences. The aim is to support preparedness activities, keep stakeholders cognizant and engaged for attaining preparedness goals and ready to work together in an event of a pandemic, as well as to encourage the continuous alignment of operational and strategic practices to evolving technological advancements.

Guidance in development and implementation of a national deployment and vaccination plan for vaccines against pandemic influenza and other respiratory viruses of pandemic potential (NDVP). Geneva: World Health Organization; 2023 (https://www.who.int/teams/global-influenza-programme/public-health-preparedness/pandemic-vaccines-products, accessed 12 June 2023).

- ❑ **Adopt a holistic, comprehensive and synergistic approach by considering the full range of areas and potential medical countermeasures that are covered by the NDVP**, including planning for access, allocation and distribution of antivirals in these plans to maximize scarce resources and still achieve the desired public health goals. As stated in the WHO 2023 NDVP guidelines as part of the development, revision and testing of these plans, this includes:
  - leveraging all national, regional and international expertise and support, from various sectors in the NDVP development process;
  - designing processes and supporting structures to facilitate identification of key populations for pandemic vaccination (see Box 3 for national immunization technical advisory groups (NITAGs));
  - planning for different vaccination delivery strategies and related arrangements for supply chain management – including waste management and ensuring security of operations;
  - continuously nurturing and maintaining a trusting relationship with the public and other important stakeholders to support vaccine acceptance and demand activities (see Box 3); and
  - reviewing surveillance and information systems to support real-time management of information from monitoring and evaluation activities as well as to ensure rapid decision-making throughout deployment and vaccination operations (including to assess needs, manage logistics and supply chain, plan for and implement rapid mass vaccination, and monitor uptake, demand, safety, effectiveness and adverse events; see Chapter 2 on collaborative surveillance).

- ❑ **Make arrangements in advance to secure access to pandemic vaccine,** including:
  - contractual arrangements with manufacturers in-country (for countries that have pandemic vaccine manufacturing capacity, e.g. for Influenza, COVID-19) and/or abroad (see Box 3 for influenza vaccine switch below); and
  - agreements with regional or international agencies and associations to procure pandemic vaccines.

See WHO webpages: Partners Platform for Health in Emergencies and International Coordinating Group (ICG) on Vaccine Provision.

- ❑ **Assess how existing routine immunization programmes (e.g. for seasonal influenza, COVID-19) across the life course can be leveraged** for pandemic vaccine deployment (see Box 3 below).

- ❑ **Assess, and revise as needed the standing policy on, and legal basis for, influenza and COVID-19 vaccination of HCWs, workers in essential services and individuals at high risk** (e.g. laboratory personnel working with pathogens of pandemic potential). Decide whether the standing vaccination policy needs to be adapted to increase uptake during different pandemic periods (see also section 1.2 on policy, legal and normative instruments).

- ❑ **Foundational all-hazard actions** on vaccination and chemoprophylaxis (see Annex 1: A5.2).

Box 3. Leveraging seasonal/routine influenza vaccination for pandemic response

Countries with a seasonal/routine immunization programme for Influenza (and potentially also for COVID-19[a]) may benefit in the event of a pandemic by sustaining vaccine programme capacity, building public trust in the vaccine, testing elements of the vaccine deployment infrastructure and strengthening national regulatory authorities and national immunization advisory groups. Furthermore, establishing a seasonal or annual vaccine policy can also facilitate the decision-making process, help in identifying and triaging priority groups and enhance vaccine acceptance.

Vaccine demand must be promoted at the community level within health systems, and at a policy level, so that people have confidence in vaccines that work, are safe and are part of a trustworthy medical system. Many unique attributes of routine influenza vaccination can impact vaccine confidence and uptake and must therefore be considered and actively managed when developing effective confidence and demand strategies. High-quality health service delivery, supported by adequate supply and appropriate policies, must meet high community demand for a vaccine to reach high vaccine coverage and thereby reduce morbidity and mortality.

[a] In principle, the same actions apply for countries with routine/annual COVID-19 vaccination, but there is currently no evidence base for this recommendation.

Box 3. Leveraging seasonal/routine influenza vaccination for pandemic response

For countries that implement (or are considering) a routine seasonal influenza vaccination programme:

- ❑ **Develop strategies to reach targets for seasonal influenza vaccination coverage and priority groups for vaccination**, including outreach, assessment of barriers to vaccination (including acceptance and demand assessments), distribution, administration, funding and involvement of both public and private stakeholders to understand programme strengths and challenges.
- ❑ **Ensure availability of annual supplies of seasonal influenza vaccine** from domestic or international sources.
- ❑ **Establish systems (preferably electronic) to report and monitor** vaccine coverage and adverse events following vaccination (see Chapter 2 on collaborative surveillance).
- ❑ **Implement the tools and guidance for measuring behavioural and social drivers of vaccination (BeSDV)** (see key resources and also influenza-specific guidance when available) to better understand what drives uptake of seasonal influenza vaccine, including tracking trends over time and reducing coverage inequalities.
- ❑ **As appropriate, consider offering seasonal influenza vaccination to people who work with animals or birds during outbreaks of novel influenza**. This may decrease the risk of dual infection with seasonal influenza and novel influenza viruses.
- ❑ **Develop draft materials to communicate risk assessment findings and recommendations to switch from production of seasonal influenza vaccine to pandemic influenza vaccine to manufacturers**, taking into consideration seasonal vaccine supply implications.
- ❑ **Develop draft RCCE strategy and materials** to explain to communities the need for a new vaccine (due to the switch from production of seasonal influenza vaccine to pandemic influenza vaccine) and recommendations (see section 3.4 on RCCE).

For countries that do not implement a routine seasonal influenza vaccination programme:

- ❑ **Consult with, or establish, a NITAG to review policies on seasonal vaccine use, targets for vaccination** coverage and priority groups for vaccination according to the WHO Strategic Advisory Group of Experts on Immunization (SAGE) recommendations (e.g. for influenza: HCWs, pregnant women, the elderly and people with underlying health conditions).

Key resources:

See WHO webpage: National Immunization Technical Advisory Groups (NITAGs) (accessed 20 July 2023).
See WHO webpage: WHO Strategic Advisory Group of Experts on Immunization (SAGE) (accessed 20 July 2023).

Guidance in development and implementation of a national deployment and vaccination plan for vaccines against pandemic influenza and other respiratory viruses of pandemic potential (NDVP). Geneva: World Health Organization; 2023 (https://www.who.int/teams/global-influenza-programme/public-health-preparedness/pandemic-vaccines-products, accessed 12 June 2023).

Vaccines against influenza: WHO position paper – May 2022. Wkly Epidemiol Rec. 2022; 97(19):185–208 (https://apps.who.int/iris/handle/10665/354265, accessed 12 June 2023).

COVID-19: coronavirus disease 2019; HCWs: health and care workers; NITAG: national immunization technical advisory group; RCCE: risk communication and community engagement; WHO: World Health Organization.

Box 3. Leveraging seasonal/routine influenza vaccination for pandemic response

Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/354459, accessed 12 June 2023).

Seasonal influenza vaccines: an overview for decision-makers. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/336951, accessed 12 June 2023).

Finding the signal through the noise: a landscape and framework to enhance the effective use of digital social listening for immunization demand generation. Geneva: GAVI; 2021 (https://www.gavi.org/sites/default/files/2021-06/Finding-the-Signal-Through-the-Noise.pdf, accessed 12 June 2023).

See Vaccination Demand Hub webpage: Knowledge Base, for training on social listening, infodemic management and addressing health misinformation (accessed 12 June 2023).

5.3 Health emergency response: essential medicines, products and materials

- ❑ **Maintain and further develop a secure national (and/or ensure access to an international) stockpile of essential medicines, products and materials[1] for priority respiratory pathogens** during the interpandemic phase to support emergency response needs. As part of this, assess the financial and logistical ability to access national and international stockpiles during a pandemic.

- ❑ **Map available in-country resources (inventory review) and forecast requirements (i.e. identify items and quantities) of quality-assured essential medicines, products and materials[1] for priority respiratory pathogens** at each level of health care and in conjunction with key operational pillars and partners (based on context and supported by WHO guidance and tools).

  World Health Organization model list of essential medicines: 22nd list. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/345533, accessed 12 June 2023).

  See WHO webpage: Essential resource planning - COVID-19 Essential Supplies Forecasting Tool (accessed 20 July 2023).

- ❑ **Ensure coordinated access to essential medicines, products and materials[1] for priority respiratory pathogens is maximized through global, regional or country level pre-negotiated agreements**, including advance purchase agreements, benefit agreements and long-term agreements with existing suppliers.

[1] **Essential medicines, products and materials necessary for the response to maintain essential health services and for priority respiratory pathogens** include: emergency kits, PPE, diagnostics, medical consumables, medical devices, therapeutics, medicines (including antivirals for treatment and prophylaxis, antibiotics) and biomedical equipment (hydration, oxygen and ventilation support), and pandemic vaccines. See also WHO's Disease Commodity Packages, which are available for pandemic influenza, COVID-19 and MERS, among other diseases.

- ❑ **Develop plans and systems to manage stocks of medicines, products and materials[1] for priority respiratory pathogens**, including secure storage and transportation (map major public and private distribution centres), taking into consideration possible supply and transport disruptions during a pandemic.

- ❑ **Strengthen or establish local production capacities for essential products and materials[1] for priority respiratory pathogens** (where feasible) that can scale rapidly and be leveraged for multiproduct technology.

- ❑ **Foundational all-hazard actions** on health emergency response: essential medicines, products and materials (see Annex 1: A5.3).

5.4 Health emergency response: research, development and innovation

- ❑ **Provide an enabling environment/ecosystem for pandemic respiratory pathogen research and development, including:**
  - facilitating synergies among stakeholders (throughout the continuum of research to utilization of clinical trial data in clinical practice);
  - pre-negotiating access and benefit-sharing agreements (advance purchase agreements, technology transfer agreements) for accelerated emergency research and development of countermeasures;
  - establishing clear and rapid national procedures for sample and data sharing, safety and ethics; and
  - ensuring requisite policies are in place in line with the national context for accelerated emergency research and development of countermeasures.

- ❑ **Participate (if feasible) in standardized national, regional and/or global research efforts** and initiatives that include respiratory pathogens, including clinical trials and other investigations and studies that apply standard protocols for comparable results, to accelerate operational research and development in public health emergencies.

For example (this list is not exhaustive), see: Coalition for Epidemic Preparedness Innovation (CEPI), Global Research Collaboration for Infectious Disease Preparedness (GLoPID-R), Integrated Services for Infectious Disease Outbreak Research (Isidore), International Severe Acute Respiratory and emerging Infection Consortium (ISARIC), WHO COVID-19 solidarity therapeutics trial, WHO public health research agenda for influenza, WHO R&D blueprint, WHO Respiratory Investigations & Studies (Unity Studies), (all websites accessed 20 July 2023).

- ❑ **For countries with resources and capacity, promote research and development to identify or improve medical countermeasures, PHSM, IPC and candidate products** for both (i) respiratory pathogens known to have pandemic potential such as influenza viruses and coronaviruses, and (ii) unknown novel respiratory pathogen X by selecting prototype-pathogens from pathogen families known to infect humans.

- ❑ **Update or develop knowledge translation mechanisms** to translate evidence into public health policy in emergencies.

- ❑ **Foundational all-hazard actions** on health emergency response: research and development (see Annex 1: A5.4).

6 Monitoring, evaluating, testing and revising plans (See PRET Module 1: Chapter 7)

6.1 Monitoring and evaluation

- ❑ **Set key indicators and establish systems to assess pandemic preparedness** (see PRET Module 1: Chapter 7 and the PIP Framework indicators).

  Pandemic influenza preparedness framework: partnership contribution high-level implementation plan III 2024–2030. Geneva: World Health Organization; 2023 (https://apps.who.int/iris/handle/10665/366981, accessed 20 July 2023).

- ❑ **Set timelines to conduct regular reviews of ongoing respiratory pathogen pandemic preparedness, response and recovery activities** as the situation progresses. Establish mechanisms to implement recommendations for improvement immediately.

- ❑ **Establish mechanisms to conduct in-depth evaluations of the pandemic response and recovery at all levels**, both during (early action review and intra-action review) and after (after-action review) the pandemic. These mechanisms should be tested during severe respiratory epidemics, and recommendations should be developed to enhance preparedness, emergency response procedures and health systems, and integrated into pandemic preparedness and business continuity plans.

  See WHO webpage: Intra-Action Review (accessed 20 July 2023).

  Guidance for conducting an early action review (EAR): rapid performance improvement for outbreak detection and response. Geneva: World Health Organization; 31 August 2023 (https://iris.who.int/handle/10665/372579, accessed 19 Oct 2023).

  Guidance for after action review (AAR). Geneva: World Health Organization; 2019 (https://apps.who.int/iris/handle/10665/311537, accessed 20 July 2023).

  WHO guidance for business continuity planning. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/324850, accessed 20 July 2023).

- ❑ **Establish plans to conduct post-pandemic evaluations**, looking at:
  - the social impact of the pandemic, including the impact on affected communities, health care services and essential services; and
  - the economic impact of the pandemic, including the impact on trade and travel, lost business revenue and the financial cost of response and recovery.

- ❑ **Share evaluation findings with WHO and other partners** to improve global pandemic preparedness planning and guidance.

- ❑ **Foundational all-hazard actions** on monitoring and evaluation (see Annex 1: A 6.1).

6.2 Testing and revising plans

- ❑ **Regularly review and update the national and associated sub-national or cross-sectoral respiratory pathogen pandemic preparedness plans**, including:
  - after each pandemic or other relevant public health emergency;
  - based on the findings of an IHR JEE or other evaluation or exercise; and
  - at a defined regular time period.

Joint external evaluation tool: International Health Regulations (2005), 3rd ed. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/357087, accessed 20 July 2023).

- ❑ **Conduct regular simulation exercises** (e.g. table-top exercises, full-scale exercises, cross-border exercises) to test, review and update components of the national respiratory pathogen pandemic preparedness plan, including pathogen-specific (e.g. for influenza viruses, MERS-CoV, pathogen X) reviews and table-top exercises.

WHO simulation exercise manual: a practical guide and tool for planning, conducting and evaluating simulation exercises for outbreaks and public health emergency preparedness and response. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/254741, accessed 20 July 2023).

- ❑ **Use events such as seasonal influenza epidemics or outbreaks of zoonotic respiratory infections to maintain, exercise and enhance capacity** (human resources, relevant skillsets, equipment, etc.).

- ❑ **Share lessons learned with WHO and other countries and partners** to improve global pandemic preparedness planning and guidance.

- ❑ **Foundational all-hazard actions** on testing and revising plans (see Annex 1: A 6.2).

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Annex 1. All-hazard preparedness actions

The preparedness actions listed in this annex are relevant to respiratory pathogen pandemics but are all-hazard in nature, in that they will strengthen a country's ability to prepare and respond to any public health emergency. These are mapped to IHR (2005) core capacities to draw links and integrate the essential capacities needed to manage respiratory pathogen pandemics with the core capacities required to manage broader health security threats.

The headings link with the core capacities (C1–C15) stated in the 2021 SPAR tool (*1*) and the technical areas outlined in the 2022 JEE tool (*2*) and the 2023 WHO IHR benchmark tool (*3*). This mapping has been kept at the "higher" technical area level to accommodate foreseen changes in the indicator numbering as updates occur.

The actions in this annex are intended to be comprehensive but non-duplicative with other existing documents. Therefore, a minimal description is included if it is already elaborated on in the IHR monitoring and evaluation tools. **The IHR monitoring and evaluation tools contain more detailed actions, guidance and references on how these all-hazard capacities can be developed and enhanced.**

A1. Emergency coordination

A1.1 Planning SPAR-C7; JEE-R1, -P3; IHR benchmark-3, -12

- Develop, implement and monitor a national action plan for IHR, preparedness or health security and ensure functional advocacy mechanisms for high-level support of health emergency preparedness and IHR implementation.
- Assess and assign priorities to risks based on analyses of hazards, exposures, vulnerabilities and capacities to develop inventories and maps of available resources for emergency preparedness and response, and plan for effective utilization.

A1.2 Policy, legal and normative instruments SPAR-C1; JEE-P1; IHR benchmark-1, -12

- Document and review legal instruments to identify gaps across relevant sectors and develop new or revised legal instruments as necessary to support and facilitate IHR implementation and compliance in a more efficient, effective or beneficial manner.
- Ensure to apply all-hazard health emergency and disaster risk management principles and approaches across the IHR capacities.

A1.3 Coordination SPAR-C2; JEE-P3, -R1; IHR benchmark-3, -12

- Establish a fully functional IHR national focal point and strengthen it as a resourced centre.
- Establish a multisectoral IHR coordination mechanism to support implementation of prevention, detection and response activities.

- Develop a management and coordination mechanism for timely emergency response to all hazard health emergencies and disasters.
- Develop PHEOC capacities, procedures and plans to enable countries to respond in a timely manner to all hazard emergencies and disasters.

A1.4 Financing SPAR-C3; JEE-P2; IHR benchmark-2

- Ensure financing is available for implementation of IHR capacities.
- Put in place financing mechanisms to ensure that funds are available and flexible for timely response to public health emergencies.
- Test funding procedures to enable more flexible and timely use of funds during emergency events while avoiding extra budgetary processes or risk of misuse.

A1.5 Human resources SPAR-C6; JEE-D3, -R1; IHR benchmark-11, -12

- Develop and implement a valid (recognized by law or official government protocols) and up-to-date (not older than 5 years) (i) workforce strategy for a functional multisectoral health workforce and (ii) workforce surge strategy for health emergencies.
- Develop functional competency-based education programmes, including workplace-based learning and in-service programmes aligned with multisectoral workforce strategy at all levels.
- Establish a sustainable field epidemiology training programme or other applied epidemiology training programme.
- Develop a functional system for activating, sending, receiving and coordinating health personnel and teams during a health emergency.

A1.6 Guiding principles, gender and ethical considerations SPAR-C1; JEE-P1; IHR benchmark-1

- Integrate gender equity and equality within all IHR capacity areas, to ensure gender-based health inequities and inequalities are not exacerbated by health emergency prevention, preparedness, response or recovery interventions.
- Conduct systematic gender analysis of IHR capacities and develop, fund and operationalize action plans to address gender gaps and inequalities, with mechanisms in place for monitoring, evaluation and reporting.

A2. Collaborative surveillance

A2.1 – A2.3 Surveillance SPAR-C5; JEE-D2, -P4; IHR benchmark-4, -10, -12

- Develop and strengthen the surveillance system to identify potential events of concern for public health and health security, including a well-functioning early warning surveillance system.
- Establish robust well-functioning early warning, alert and response capacity for verifying and investigating detected events.
- Conduct timely and systematic analysis and sharing of data and information and enhance evidence for decision-making and action.

- Apply and strengthen electronic tools, including data use and governance plans, an interconnected data management system (linking between epidemiology, laboratory, clinical, environmental, bioinformatics data, etc.) and an electronic bulletin or accessible surveillance dashboard for surveillance systems.
- Ensure that mechanisms are in place for meeting obligations under IHR (2005) to detect, assess, notify and report events. Such mechanisms include the capacities to respond promptly and effectively and requisite capacities at designated PoE relating to the identification and management of pandemic risks in accordance with IHR (2005) Annex 1A and 1B.2.
- Develop national AMR surveillance systems across sectors (human health, animal health and agriculture) for surveillance of pathogens of concern, and to facilitate data sharing and joint analysis for action.
- Develop capacities to conduct regular strategic risk profiling, readiness assessment and rapid risk assessments for determining risks to be prioritized for health emergency management and to support decision-makers during emergencies.

A2.4 Laboratory SPAR-C4; JEE-D1, -P7; IHR benchmark-8, -9

- Strengthen specimen referral and transport system.
- Implement a national laboratory quality management system for national and subnational laboratories. Participate in WHO's External Quality Assessment Project or other similar programmes.
- Strengthen laboratory testing for detection of priority diseases.
- Establish an effective national diagnostic network.
- Develop and implement a biosafety and biosecurity programme management system for all sectors (including human, animal and agricultural facilities), defining relevant training and practices.
- Conduct a national inventory of laboratories with adequate biopreparedness or capability to manage high-threat pathogens based on risk assessment.
- Recommend that relevant laboratory staff (personnel responsible for preparing dangerous goods) undertake the Infectious Substances Shipping Regulations training in accordance with international regulations on the transport of infectious substances.
- Ensure a functional LIMS to ensure traceability of results, facilitate data management and sharing.

A2.5 One Health/zoonotic disease: collaborative efforts SPAR-C12; JEE-P5; IHR benchmark-5

- Strengthen multisectoral surveillance systems and response mechanisms for priority zoonotic diseases/pathogens.
- Establish or strengthen One Health collaborative efforts across sectors on activities to address zoonoses.
- Conduct periodic joint risk assessments for pathogens at the human–animal interface.

A3. Community protection

A3.1 – A3.2 Public health and social measures IHR benchmark-20

- Strengthen health literacy and co-ownership of intervention development and implementation.
- Establish and strengthen functional, multisectoral leadership and governance for PHSM that is embedded in health emergency preparedness, response management and health systems strengthening.

A3.3 Border health and points of entry SPAR-C11; JEE-PoE; IHR benchmark-17

- Establish routine capacities at designated PoE.
- Strengthen capacity for effective public health response at PoE.
- Establish and maintain cross-border surveillance and coordination mechanisms particularly at ground crossings.
- Develop or strengthen multisectoral strategy/mechanisms at the national and/or subnational level, as well as at relevant PoE, for applying a risk-based approach to the use of international travel-related measures during health emergencies:
  - considering prevention, detection/investigation, response and recovery;
  - for strategic planning of, decision-making and operationalization of travel-related measures; and
  - ensuring respect for dignity, human rights and fundamental freedoms and that the financial burden is not placed on international travellers, in accordance with Article 40 of the IHR.
- Notify WHO of the rationale and basis for health measures implemented to respond to a potential Public Health Emergency of International Concern (PHEIC) in accordance with IHR (2005).
- Develop or update guidance for vaccination certification, including potential introduction of digital documentation in line with WHO recommendations, guidance and global interoperability standards.

A3.4 Risk communication and community engagement SPAR-C10; JEE-R5; IHR benchmark-16

- Develop and integrate RCCE systems, with mechanisms for functions and resources, within broader emergency programmes.
- Develop a system for risk communication for emergencies and unusual events, including legal and policy frameworks and a national multihazard (including for priority pathogens of pandemic potential) and multisectoral emergency risk communication plan.
- Operationalize mechanisms to deliver quality, timely and impactful risk communication.
- Initiate or maintain sector-specific stakeholder platforms or other mechanisms at all stages of pandemic preparedness and response to ensure information is adequately exchanged, understood and is representative of communities' needs, interests and concerns.

- Establish or strengthen capacity building mechanisms in community engagement for a multisectoral community health workforce for community-centred governance and management of health emergencies, and resilience building.
- Establish a routine social listening and infodemic management system for health emergencies and unusual events.
- Initiate or maintain peer-exchange platforms such as science translation networks, that enable exchange of pandemic experience and learning among academia, researchers, media, health professionals and decision-makers.

A4. Clinical care

A4.1 Health service provision: continuity of essential health services

SPAR-C8; JEE-R3, -P8; IHR benchmark-7, -14

- Increase vaccine coverage for priority vaccine-preventable diseases in the country.
- Develop capacity and a functional mechanism to assess and monitor health system performance and continuously assess the burden on the local health system, including ongoing delivery of essential health services and utilization of services, before, during and after emergencies at all levels of health service delivery. Use indicators for coping and surge capacity (e.g. number of hospital beds, trained workforce) and thresholds to trigger support including the potential need to dynamically remap service delivery platforms.
- Define, develop and maintain a functional package of essential health services (EHS), plans/guidelines on continuity of EHS in emergencies, and mechanisms for monitoring service continuity at the national, intermediate and primary public health level, including the following:
  - A specific list of essential services (based on context and supported by WHO guidance and tools), including nongovernment/private service providers.
  - Mapping the essential services list to resource requirements and agreements that may be required for their use during a pandemic.
  - Mechanisms to mobilize and add appropriate technical and operational resources to deliver essential health services.
  - Mechanisms to govern essential public health service delivery: prioritise and identify routine and elective services that could be delayed or relocated to non-affected areas.
  - Equitable access to all: ensure the needs of marginalized and vulnerable populations are addressed.
  - Strengthen emergency units at first level hospitals in order to provide acuity-based triage and manage emergency health conditions and common acute presentations that require time-sensitive intervention.
  - A roadmap including thresholds that activate a progressive phased reallocation of routine service capacity towards essential services. Also, for the re-expansion and transformation of services as the pandemic evolves.

- Clear criteria, protocols and mechanisms to ensure continuity of care during times of surge; for example for: targeted referral and counter referral pathways, transfer of patients between facilities, hospital or intensive care unit bed tracking, centralized patient distribution and call centres.

- Develop a communication framework and create capacity to disseminate information with clearly defined channels, to ensure timely and accurate information communication: (i) between pandemic response authorities and all health care providers, (ii) to prepare the public and guide safe care-seeking behaviour.

A4.2 Health service provision: case management SPAR-C8; JEE-R3; IHR benchmark-12, -14

- Develop, implement and regularly review and update case management procedures/guidelines for all relevant IHR hazards.
- Establish a clinical working group that includes experts from the public and private sectors to ensure broad expertise and alignment.
- Develop and implement training resources to update biomedical engineers/ technicians, and develop tools to evaluate the training level of service engineers, regarding repair/maintenance, testing/calibration, inventory and overall management of medical devices as well as accessories to ensure proper and safe use.
- Assess, develop and establish safe and resilient hospital and health facility capabilities as part of the hospital safety programme before, during and after emergencies.

A4.3 Infection prevention and control SPAR-C9; JEE-R4; IHR benchmark-15

- Implement and/or strengthen active national and health care facility IPC programmes according to WHO-recommended core components and minimum requirements with a strong primary care foundation, and with trained personnel.
- Develop recommendations, national standards and resources for a safe built environment (including floor plans):
  - adequate WASH capabilities and health care waste management in health care facilities;
  - screening and triaging patients, isolating suspected and confirmed cases and managing patient flow in facilities treating pandemic cases;
  - sterilization services in health care facilities, including appropriate infrastructure, materials and equipment for IPC; and
  - standards for reduction of overcrowding and for optimization of staffing levels in health care facilities, according to WHO minimum requirements.
- Set up systems to ensure that HCWs, laboratory personnel and volunteers receive appropriate IPC education and training, including in early detection and standard practices for IPC.
- Establish quality of care monitoring, auditing and feedback systems in health care facilities, with a focus on occupational health and patient safety.

- Develop and maintain a functioning and effective system for health-care-associated infection surveillance (for ongoing surveillance of endemic health-care-associated infections, including AMR pathogens, and for early detection of pathogens prone to infectious disease outbreaks) at the national and health facility level, including implementing a national strategic plan.
- Ensure a safe environment in all health care facilities for HCWs, patients, caregivers, visitors and any other service providers/users.

A4.4 Safe management of a dead body

- Develop or update guidelines for managing burials with safe and dignified practices and adapt burial ceremonies to reduce transmission risks while meeting local cultural, social and religious needs.
- Assess the maximum capacity of the funeral services sector to transport bodies and perform burials, cremations or other acceptable equivalent.
- Develop protocols and capacities for managing excess mortality at the community level for deaths outside health facilities.
- Consider identifying alternative sites that may be designated as cemeteries if existing capacity is exceeded.
- Review procedures to certify deaths and issue death certificates. Assess whether these can be scaled up easily, or whether surge capacity or expedited procedures may be needed.

A5. Access to countermeasures

A5.1 Health emergency response: emergency logistics and supply chain management SPAR-C7; JEE-R1; IHR benchmark-12

- Develop a functional system for activating and coordinating emergency logistics and supply chain management during a health emergency.
- Plan for the need, and train staff with correct technical capacity, to support routine and pandemic operation support and logistics planning and implementation functions at the national level.
- Work with key humanitarian partners to establish coordination mechanisms and adequate technical capacity to provide operational support and logistics support in the direct delivery of supplies, equipment and services for people in hard-to-reach areas.

A5.2 Equitable access, needs-based allocation and medical countermeasures deployment for pandemic products such as vaccines and antivirals – NDVP planning JEE-P8; IHR benchmark-7, -12

- Strengthen capacity for vaccine access and delivery to target populations.
- Strengthen capacity for mass vaccination for epidemics of vaccine-preventable diseases.
- Develop inventories and maps of available resources for emergency preparedness and response, and plan for effective utilization based on country risk profiles.
- Develop or strengthen electronic immunization registries, as well as electronic systems for adverse event surveillance.

A5.3 Health emergency response: essential medicines, products and materials IHR benchmark-12

- Develop systems to enable continuous assessment of availability of essential medicines, products and materials[1] in ambulatory and hospital settings.
- Develop mechanisms to coordinate with import customs authorities to expedite receipt and deployment of imported essential medicines, products and materials.[1]

A5.4 Health emergency response: research, development and innovation JEE-R1, IHR benchmark-12

- Develop and implement a research, development and innovation mechanism to generate evidence-based solutions for emergency preparedness and response through research and development and dissemination of findings.
- Utilize evidence from research, development and innovation in emergency preparedness and response.

A6. Monitoring, evaluating, testing and revising plans

A6.1 – 6.2 Monitoring and evaluation; testing and revising plans SPAR-C7; JEE-R1; IHR benchmark-12

- Develop an emergency exercise management programme.
- Conduct SimEx or After-Action Review/ Intra-Action Review to test multisectoral multihazard emergency response plans at national and subnational levels involving relevant sectors. Implement measures to build capacities based on outcomes and recommendations and adjust plans based on lessons learned.

Annex References

1. International health regulations (2005): state party self-assessment annual reporting tool, 2nd edition. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/350218, accessed 6 July 2023).
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