

Indicators to monitor health-care capacity and utilization for decision-making on COVID-19

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1. Introduction

1.1 Background

Routine collection and analysis of different types of data, including on health-care capacity and utilization, is important to inform preparedness and response to the novel coronavirus disease (COVID-19) outbreak. Health-care capacity and utilization data are critical inputs for informing implementation of strategies to mitigate and contain outbreaks, as well as for operational decision-making on service delivery.

While data are being collected in most settings, collection and analysis needs to be done routinely and systematically. This is particularly important as countries relax non-pharmaceutical interventions, and information on health-care capacity and utilization is needed to inform preparedness for upsurges in cases.

The purpose of this document is to provide guidance on a standard set of indicators that can be used to monitor health-care capacity and utilization for decision-making on the COVID-19 response.

1.2 Target audience

This guidance note is intended for national and subnational decision-makers and relevant stakeholders managing the COVID-19 response.

2. Routine monitoring of health-care capacity and utilization

2.1 Objectives

The objectives of routinely collecting and analysing data on health-care capacity and utilization are to inform four different but related types of decisions on COVID-19 preparedness and response:

1. **Assessing the epidemic stage** of the COVID-19 outbreak to inform mitigation and containment strategies.
2. **Determining relaxation or tightening of non-pharmaceutical interventions** based on an analysis of the extent to which health services are overwhelmed.
3. **Making operational decisions** on patient referral and distribution or diversion of resources based on utilization of health services.
4. **Tracking increases in health-care capacity and utilization** over time as a result of government and donor investments in the COVID-19 response using data on availability of health system resources, such as hospital beds, equipment and health workers.

2.2 Health-care capacity and utilization indicators

The following table outlines 11 core indicators and 9 desirable indicators that can be used to monitor health-care capacity and utilization at all stages of the COVID-19 outbreak, with corresponding suggested frequency of data collection and intended use. Core indicators are recommended as the standard set of indicators to constantly monitor. Desirable indicators may be collected in

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addition to core indicators in settings where necessary data systems and resources are available.

As each indicator has its own limitations and biases, it is recommended to monitor and draw on all core indicators to inform decision-making – or at least a combination of indicators when data for all may not be available. The indicators are also an important component of multisource surveillance and should be considered and used along with other types of data to enable evidence-based decision-making with a high level of confidence.

The proposed frequency of data collection for indicators may need to change based on the stage of the epidemic. For example, data on bed occupancy may need to be collected daily to inform real-time operational decision-making when caseloads and hospitals admissions are high. During stages of the epidemic when caseloads are lower, this may be done on a weekly basis. In addition, depending on country context and the stage of the epidemic, decisions may be taken to monitor health-care capacity and utilization indicators at different administrative and health system levels.

2.3 Systems for data collection and analysis

Routine monitoring of the health-care capacity and utilization indicators may require strengthening existing and/or establishing new information systems for collecting and analysing data.

Specific actions to consider when initiating or strengthening monitoring include:

- Identifying available data sources (routine information systems or other) for the core indicators and any selected desirable indicators; determining the current availability of data from these sources and any limitations with the sources.
- Determining actions to strengthen existing sources or to establish new information systems such as developing metadata, standard operating procedures and training for staff responsible for data entry, consolidation and analysis.
- Identifying digital health technologies available to facilitate data collection and analysis such as mobile applications and electronic medical records, as well as the corresponding data governance and standards required.
- Developing a central database to consolidate, clean and analyse data for the health-care capacity and utilization indicators.
- Establishing or modifying (where necessary) procedures to combine data that may not be standardized or interoperable to enable analysis.
- Instituting mechanisms to provide feedback on data reported and coordinate data sharing, harmonization and integration.
- Establishing mechanisms to regularly analyse and disseminate health-care capacity and utilization data such as through real-time dashboards.

Health-care capacity and utilization indicators for COVID-19 decision-making

#	Indicator	Definition	Potential data source(s)	Frequency ¹	Intended use for decision-making ²				Remarks
					Epidemic stage assessment	Non-pharmaceutical interventions	Operational decisions	Increase in health-care capacity and utilization	
Core indicators									
1a	Proportion of hospital beds occupied by COVID-19 patients	Numerator: Total number of hospital beds occupied by COVID-19 patients Denominator: Total number of hospital beds	Hospital information systems	Weekly	X	X	X	X	Indicative of hospital capacity to meet the demand for hospitalization. High bed occupancy rates could trigger alternative care pathways to reduce demand for hospital services.
1b	Alternative indicator: Proportion of dedicated COVID-19 hospital beds occupied	Numerator: Total number of dedicated COVID-19 hospital beds occupied Denominator: Total number of dedicated COVID-19 hospital beds	Hospital information systems	Weekly	X	X	X	X	An alternative indicator that may be used in settings where dedicated COVID-19 hospital beds are available. Countries may also decide to monitor both 1a and 1b.
2a	Proportion of intensive care unit (ICU) beds occupied by COVID-19 patients	Numerator: Total number of ICU beds occupied by COVID-19 patients Denominator: Total number of ICU beds	Hospital information systems	Weekly	X	X	X	X	Indicative of hospital capacity to meet the demand for critical care for COVID-19.
2b	Alternative indicator: Proportion of dedicated COVID-19 ICU beds occupied	Numerator: Total number of dedicated COVID-19 ICU beds occupied Denominator: Total number of dedicated COVID-19 ICU beds	Hospital information systems	Weekly	X	X	X	X	An alternative indicator that may be used in settings where dedicated COVID-19 ICU beds are available. Countries may also decide to monitor both 2a and 2b.

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3	Proportion of dedicated COVID-19 isolation facility beds occupied	Numerator: Total number of dedicated COVID-19 isolation facility beds occupied Denominator: Total number of dedicated COVID-19 isolation facility beds	Hospital information systems	Weekly		X	X	X	Indicative of capacity in the health system to quarantine and manage mild cases.
4	Proportion of cases who are health workers	Numerator: Total number of health workers confirmed with COVID-19 Denominator: Total number of confirmed COVID-19 cases	COVID-19 surveillance systems	Weekly	X	X	X	X	Indicative of infection prevention and control measures in health facilities. Caution required with interpretation as health workers may acquire infections in the community.
5	Critical care nurse to COVID-19 patient ratio	Total number of critical care nurses Total number of ICU beds occupied by COVID-19 patients	Hospital information systems COVID-19 surveillance systems	Weekly	X	X	X	X	Indicative of health-care capacity to provide critical care services.
6	Proportion of facilities with personal protective equipment (PPE) available for the next	Numerator: Total number of facilities admitting COVID-19 patients with PPE stock available for the next two weeks based on current caseload	Hospital stock management records	Fortnightly		X	X	X	PPE defined as: coveralls, face shields, goggles, gowns, N95 masks and shoe covers.

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	two weeks based on current caseload	Denominator: Total number of facilities admitting COVID-19 patients	Hospital information systems						
7	Total number of laboratories with COVID-19 test capacity	Total number of labs in the country that can conduct molecular testing (PCR) and number of international labs that the country has access to that can provide results in ≤72 hours	Laboratory surveillance	Weekly				X	Indicative of access to laboratories with COVID-19 diagnostic capacity.
8	Laboratory turn-around time	Average number of days elapsed between collection of specimens for molecular testing (PCR) to results available	Laboratory surveillance	Fortnightly				X	Indicative of COVID-19 diagnostic capacity and bottlenecks in testing that need to be addressed.

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9	Proportion of contacts quarantined within four days of case symptom onset of the index case (or exposure to index case)	Numerator: Number of contacts of COVID-19 cases quarantined within four days of case symptom onset Denominator: Number of contacts of COVID-19 cases identified	COVID-19 surveillance systems	Weekly	X	X	X	X	Indicative of the quality of contact tracing and investigative capacity.
10	Total number of institutional deliveries	Total number of deliveries (live births and stillbirths) registered in health facilities	Routine health information systems	Monthly		X		X	Indicative of the impact of the outbreak on essential health services (access and utilization).
11	Total number of outpatient department (OPD) consultations	Total number of OPD consultations registered in health facilities	Routine health information systems	Monthly	X	X		X	Indicative of the impact of the outbreak on essential health services (access and utilization). Also a proxy for risk of increase of COVID-19. Any increasing trends should be investigated and interpreted with other indicators for epidemic stage assessment.

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					Epidemic stage assessment	Non-pharmaceutical interventions	Operational decisions	Increase in health-care capacity and utilization	
Desirable indicators									
1	Proportion of ICU beds occupied	Numerator: Total number of ICU beds occupied by COVID-19 and non-COVID-19 patients Denominator: Total number of ICU beds	Hospital information systems	Weekly	X	X	X	X	Indicative of overall ICU capacity to meet the demand for critical care.
2	Proportion of mechanical ventilators used	Numerator: Total number of mechanical ventilators being used by COVID-19 patients Denominator: Total number of functional mechanical ventilators	Hospital information systems	Weekly	X	X	X	X	Indicative of capacity to clinically manage critically ill COVID-19 cases requiring ventilatory support.
3	Total number of COVID-19 admissions	Total number of COVID-19 patients admitted (disaggregated by ICU/non-ICU)	Hospital information systems	Weekly		X	X	X	Along with discharges, indicative of patient load and health-care utilization. Depending on national protocols, admissions may also be indicative of moderate to severe cases.
4	Total number of COVID-19 discharges	Total number of COVID-19 patients discharged	Hospital information systems	Weekly		X	X	X	Along with admissions, indicative of patient load and health-care utilization.
5	Number of outreach/home visits	Number of outreach and home visits conducted to provide essential health services	COVID-19 surveillance systems	Weekly			X	X	Indicative of capacity to provide essential health services through outreach during the COVID-19 outbreak.

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6	Total number of emergency room (ER) visits	Number of ER visits for any reason	Hospital information systems	Weekly		X		X	A proxy for risk of increase of COVID-19. Increased trends in ER visits should be investigated to verify if increase is due to COVID-19.
7	Total number of health workers trained in COVID-19 case management ³	Total number of health workers trained in case management of COVID-19 cases in the previous week	Training records	Weekly				X	Training can be either in person or online. If online, it should be part of a training programme/strategy developed by relevant actors such as national governments and national and international partners, either individually or in collaboration. A list of invited participants should be available for online training, and a mechanism to confirm their participation in the training should exist. Open and publicly available webinars are not included.

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					Epidemic stage assessment	Non-pharmaceutical interventions	Operational decisions	Increase in health-care capacity and utilization	
8	Percentage of acute health-care facilities with triage capacity ³	Numerator: Total number of acute health-care facilities with triage capacity Denominator: Total number of health-care facilities	Hospital information systems	Monthly			X	X	Acute health-care facilities are defined as settings used to treat sudden, often unexpected, urgent or emergent episodes of injury and illness that can lead to death or disability without rapid intervention. May comprise secondary, tertiary or field hospitals, public or private, with inpatient capacity. Triage is the sorting and classification of patients to determine priority of need and proper place of treatment. Acuity-based triage is the standard method of sorting patients in the medical setting.
9	Percentage of acute health-care facilities with isolation capacity ³	Numerator: Total number of acute health-care facilities with isolation capacity Denominator: Total number of acute health-care facilities	Hospital information systems	Monthly			X	X	Acute health-care facilities are defined as above. Isolation capacity is defined as the availability of single rooms and/or areas for cohorting appropriately equipped with PPE for contact and droplet precautions.

CPAP: continuous positive airway pressure; PCR: polymerase chain reaction.

¹ Frequency of data collection may change based on the stage of the epidemic and data needs for decision-making.

² Intended use for decision-making is based on the four types of decisions for which health-care capacity and utilization data may be used: epidemic stage assessment of the COVID-19 outbreak to inform mitigation and containment strategies; determination of whether to relax or tighten non-pharmaceutical interventions; operational decisions on patient referrals and distribution or diversion of resources; and tracking of increases in health-care capacity and utilization over time.

³ Included in COVID-19 strategic preparedness and response (SPRP): monitoring and evaluation framework. Geneva: World Health Organization; 2020.

3. Guidance development

3.1 Acknowledgements

This document was developed by a guideline development group composed of staff from the WHO Regional Office for the Western Pacific (Division of Health Systems and Services and WHO Health Emergencies Programme).

3.2 Guidance development methods

This document was developed based on a review of relevant literature and guideline development group discussion and consensus.

3.3 Declaration of interests

Interests have been declared in line with WHO policy, and no conflicts of interest were identified from any of the contributors.