Annex 1: Methodology, Data Collection, and Analysis

Methods

This practice paper is extracted from a much larger study, triangulating findings from these 3 sources, to present the thematic analysis in this study (15, 16). This study followed a mixed-methods design triangulating the findings from a regional literature review with the qualitative findings of an open-ended online survey (n=139), and in-depth key informant interviews (KI/Is) with 46 policymakers and hospital managers (HMs) from 18/22 EMR countries. This research used a phenomenology approach exploring the experiences of hospital managers in response to COVID-19 across the EMR.

Amongst the numerous tools reviewed to assess hospitals' preparedness for COVID-19, the WHO EMRO's *"Hospital readiness checklist for COVID-19"* was selected as the guiding framework for this study (8–10,17,18). There are 10 domains in this checklist which hospitals should prioritize for an effective response against COVID-19; namely: 1) Leadership and Coordination, 2) Operational Support, Logistics and Supply Management, 3) Information, 4) Communication, 5) Human Resources, 6) Continuity of Essential Services and Surge Capacity, 7) Rapid Identification, 8) Diagnosis, 9) Isolation and Case Management, and 10) Infection Prevention and Control (19).

Data Collection

Key Informants (KIs) were recruited for in-depth interviews by their respective WHO country offices (Table 1). Participation was voluntary and all participants consented after receiving all relevant information, a detailed consent form, and a copy of the topic guide. A topic guide for semi-structured interviews was created, piloted, and modified, guided by checklist domains. Due to pandemic social distancing restrictions, all KIs were interviewed online (using Zoom) for 50-90 minutes by 2 members of the research team. Interviews were conducted in English, with few conducted in either fully or partially in Arabic, Persian, or French. To increase data validity and reliability, active listening, and probes along with prolonged engagement and immersion with the data were used to increase credibility. Interviews were recorded and kept in secure files to be deleted within 2 years of project finalization; a record of analytical activities were also kept increasing the dependability of the findings. Confirmability of findings was ensured as interviews were transcribed using an electronic software, reviewed by all members of the research team, and cross-referenced against the notes taken by both interviewers.

Table 1: Selected key informants quoted in this paper

KI #	Country	Type	Designation
1	Palestine	WHO Staff	Technical Officer
2	Afghanistan	WHO Staff	Technical Officer
3	Pakistan	Hospital manager	Deputy CEO AKU Hospital
4	Oman	Hospital manager	Director General of Khoula Hospital
5	Kuwait	Hospital manager	Director of Designated Public Hospital for COVID-19
6	Afghanistan	Policymaker	General Directorate of Policy and Planning MoPH
7	Oman	Hospital manager	Director General Royal Hospital
8	Iraq	Policymaker	Former Director General of Hospitals in MOH

An online questionnaire was developed, piloted, and disseminated to key stakeholders (particularly hospital managers (HMs), clinical directors, management teams, senior front-line health professionals). The survey included 5 open-ended questions regarding experiences, challenges, lessons learned, and the roles and expectations of hospitals, governments, and WHO, which provided rich qualitative data for further analysis. Following data cleaning, a total of 139 relevant and complete responses were reviewed and analyzed from 14/22 EMR countries (Table 2). About 60% of participants worked in tertiary hospitals, while 91% indicated that their hospital was government or publicly owned and operated. About
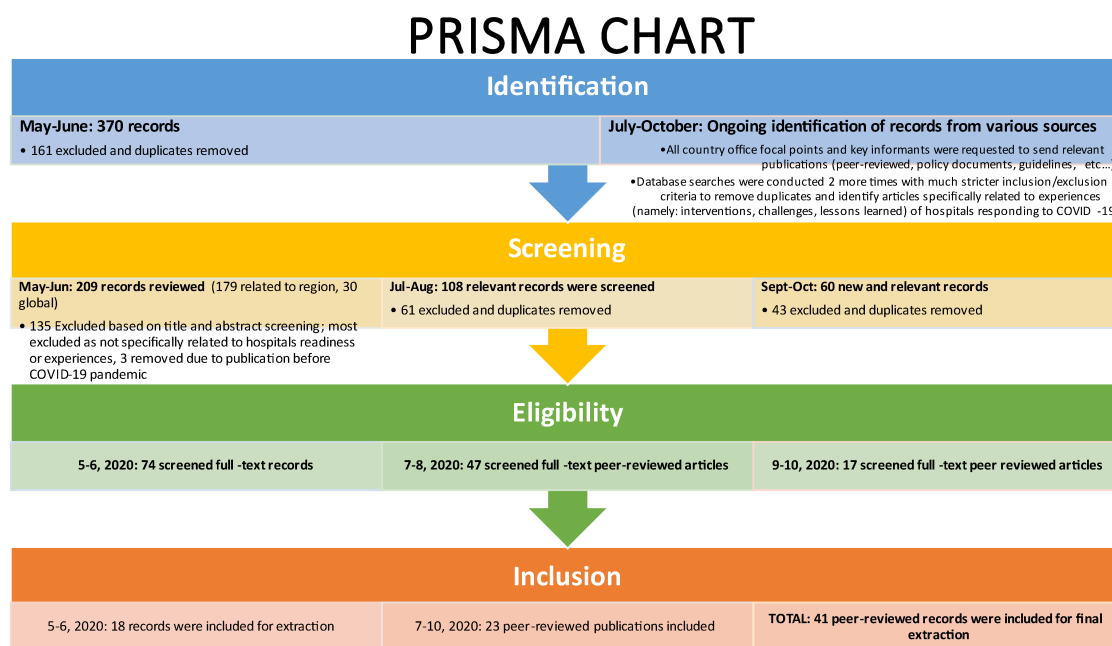
93% of survey responses indicated that their hospital had admitted COVID-19 patients while 75% indicated that their hospital was designated for COVID-19 response.

Table 2: Characteristics of Survey Respondents (n=139)	**Number of Responses**	**Percent (%)**
Sex		
Female	67	48%
Male	72	52%
Age group		
<35	33	24%
35-50	79	57%
>50	27	19%
Country		
Afghanistan	4	3%
Iraq	12	9%
Kuwait	10	7%
Libya	3	2%
Morocco	6	4%
Oman	48	35%
Pakistan	12	9%
Palestine	3	2%
Saudi Arabia	1	1%
Somalia	1	1%
Sudan	24	17%
Syria	3	2%
Tunisia	6	4%
Yemen	6	4%
Profession		
Hospital Director and Management team	30	22%
Director of Clinical Department	30	22%
Medical Doctor and Consultant	18	13%
Technician	17	12%
Director of Nursing	14	10%
IPC focal point	11	8%
Policymaker	11	8%
Nurse	8	6%
Years of experience		
<5 years	23	17%
5-10 years	27	20%
>10 years	87	64%

A scoping literature review was also conducted to answer the research question: "What were hospitals' experiences combatting COVID-19 in the EMR?" Due to the limited literature at the beginning of the pandemic, particularly related to lessons learned, this broader research question was utilized to identify key lessons learned from hospital experiences regionally. Major databases including PubMed, CINAHL, ScienceDirect, Springer Link, and Google Scholar were searched with keywords related to hospitals responses to COVID-19, each of the 22 EMR countries, and each of the checklist domains. Searches were limited to articles on humans, published in 2020 or 2021, and written in Arabic, English, or French. Articles which were not specific to the lessons learned from hospitals experiences combatting COVID-19

from the countries of the EMR were excluded. Literature was searched three times from May-Oct 2020 (Figure 1) and updated from Jan-Mar 2021 to ensure that new and relevant publications were identified and screened for eligibility and inclusion; 10 additional relevant entries were added during the update. A total of 51 peer-reviewed articles were included in the final triangulation of the data. Additionally, a review of reference lists, snowballing, and grey literature search was conducted to identify other relevant entries. Included articles underwent document analysis and were extracted according to the domains outlined in the guiding framework.

Figure 1: PRISMA chart (Initial 2020)

PRISMA CHART

Identification

May-June: 370 records	**July-October: Ongoing identification of records from various sources**
• 161 excluded and duplicates removed	• All country office focal points and key informants were requested to send relevant publications (peer-reviewed, policy documents, guidelines, etc...)
	• Database searches were conducted 2 more times with much stricter inclusion/exclusion criteria to remove duplicates and identify articles specifically related to experiences (namely: interventions, challenges, lessons learned) of hospitals responding to COVID -19

Screening

May-Jun: 209 records reviewed (179 related to region, 30 global)	**Jul-Aug: 108 relevant records were screened**	**Sept-Oct: 60 new and relevant records**
• 135 Excluded based on title and abstract screening; most excluded as not specifically related to hospitals readiness or experiences, 3 removed due to publication before COVID-19 pandemic	• 61 excluded and duplicates removed	• 43 excluded and duplicates removed

Eligibility

5-6, 2020: 74 screened full -text records	7-8, 2020: 47 screened full -text peer-reviewed articles	9-10, 2020: 17 screened full -text peer reviewed articles

Inclusion

5-6, 2020: 18 records were included for extraction	7-10, 2020: 23 peer-reviewed publications included	**TOTAL: 41 peer-reviewed records were included for final extraction**

Data Analysis

Qualitative data from the three sources (interviews, open-ended survey responses, and documents analysis), was thematically analysed using both deductive and inductive methodologies. An analytical code list was developed deductively with codes and sub-codes of the interventions proposed for each of the 10 checklist domains. A detailed inductive approach was utilized to identify and analyse additional emerging themes. The qualitative data were coded using MaxQDA2020 software. The coded segments were sorted by domain and thematic area to identify the main lessons learned for each of the 10 checklist-domains. The findings were triangulated with survey results and a literature review for further validation.