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FIFA World Cup 2022: Lessons from Qatar's Sole Receiving Center on Healthcare Delivery During Mass Gatherings

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Abstract

Background: Mass-gathering events such as the FIFA World Cup create sudden surges in healthcare demand. Qatar's response to the FIFA World Cup 2022 relied on a single centralized receiving centre — Hamad General Hospital (HGH) — operating through a structured triage and admission framework known as the "FIFA Pathway." Whether this model translated preparedness into measurable performance has not been fully examined.

Objective: To describe the demographic, operational, and clinical characteristics of non-resident patients managed at HGH during the FIFA World Cup 2022, and to assess healthcare workforce perceptions of the FIFA Pathway.

Methods: his dual-phase observational study was conducted at HGH, Qatar's sole designated receiving centre for FIFA visitors. Phase 1 retrospectively reviewed non-resident patients (≥14 years, FIFA/HAYA accreditation, or visitor status) presenting between October–December 2022. Data were extracted from CERNER electronic records, Medical Command Centre dashboards, and FIFA patient-tracking systems. Phase 2 surveyed healthcare professionals directly engaged in the FIFA Pathway using the validated MEGA-OPS questionnaire, covering domains of Self-Awareness and Reflection (SAR), Interpersonal Support and Supervision (ISS), and Practical Skills and Learning Environment (PSL).

Results: In Phase1, a total of 785 patients (mean age 38 years; 75% male) were included, predominantly from the Eastern Mediterranean, European, and African regions. Most arrived by ambulance from fan zones or stadiums, with 86% presenting during the active tournament. Emergency care dominated (64%), while only 11% required admission. Musculoskeletal, ENT, gastrointestinal, and neurological conditions were most common. Nearly all patients (98%) were discharged home, with minimal mortality (0.9%). Workforce survey (Phase2) responses (n=403) indicated favourable perceptions of communication, leadership, and operational support, though delays in bed allocation were noted.

Conclusion: Qatar's centralized single-centre model effectively absorbed the surge in demand during FIFA 2022, achieving high discharge rates and low adverse outcomes. Alignment between patient-flow data and workforce perceptions underscores system resilience, while bed management delays highlight a key area for improvement. These findings provide transferable lessons for future mass gatherings, including FIFA 2026, FIFA 2034, and the Hajj.

Introduction

In November 2022, global attention turned to Qatar — a nation of fewer than three million people — as it became the first Middle Eastern country to host the FIFA World Cup, one of the most logistically demanding sporting events in the world [1, 2]. For the clinicians and health-system planners embedded in Qatar's national healthcare response, the tournament was more than a sporting spectacle: it was a live, high-stakes test of a centralized clinical pathway under sustained, internationally scrutinized pressure.

Mass-gathering events place well-documented demands on host healthcare systems [3, 4]. Across sporting fixtures, religious pilgrimages, and large cultural or political events, planners contend with a recurring set of challenges: sudden surges in transient populations, trauma, heat-related illness, and the risk of communicable-disease transmission, all compounded by linguistic, cultural, and logistical diversity [3, 5, 6]. A substantial literature addresses surveillance and macro-level preparedness for such events [7–10], but far fewer studies examine how real-time clinical systems actually perform once a mass gathering is underway, and fewer still combine objective operational data with the perspectives of the frontline workforce delivering that care — a gap noted explicitly in pharmacy-specific evaluations conducted during the World Cup itself [11].

Qatar's healthcare strategy for FIFA 2022 was unusually centralized. Hamad Medical Corporation (HMC) designated Hamad General Hospital (HGH) as the sole receiving centre for emergency and high-acuity care among the non-resident, event-affiliated population — including HAYA cardholders, FIFA-accredited personnel, and international visitors. This single-hub model, known as the “FIFA Pathway,” consolidated triage, diagnostics, and patient flow into one structured, auditable system, supported by real-time digital dashboards, coordinated emergency medical services (EMS) dispatch, and scenario-based simulation drills [12, 13]. These elements were implemented within a compressed planning window shaped by the lingering operational and workforce pressures of the post-COVID-19 period [14, 15]. In parallel, national and global public health authorities layered broader surveillance measures onto the clinical model, including syndromic surveillance, vector- and infection-control planning, and coordinated monitoring of emerging disease risk [8, 9, 16]. These macro-level frameworks were necessary but not sufficient: the ultimate test of any mass-gathering health system lies in its micro-level operations — the receiving centres, the workflows, and the frontline teams delivering care in real time [4, 17].

Evaluating patient-level data is therefore essential to determine whether stated preparedness measures translated into efficient patient flow, timely emergency care, and appropriate admission outcomes. Retrospective analysis of emergency and inpatient utilization offers an objective, complementary indicator of healthcare-system resilience that self-reported preparedness assessments cannot provide on their own [18, 19]. In a companion study, we developed and psychometrically validated the MEGA-OPS (Mass Event Gathering Assessment – Operational Planning System) questionnaire among 200 HGH staff to capture healthcare workers' perceptions of communication, leadership support, and operational functionality during the FIFA Pathway [20]. That validation established the instrument's structure and reliability but, by design, could not address whether workforce perceptions of preparedness corresponded to what was actually happening to patients moving through the system.

This study addresses that gap directly. We combined a retrospective review of non-resident patients managed at HGH — the tournament's sole designated receiving centre — with a cross-sectional deployment of the validated MEGA-OPS instrument among the healthcare professionals who staffed the FIFA Pathway. By pairing objective patient-flow indicators with frontline workforce perceptions, this dual-phase design was intended to test whether a single, centralized receiving-centre model can absorb a mass-gathering surge without compromising timeliness or safety, and whether staff-reported system

functioning is consistent with what the underlying patient data show. The findings are intended to inform planning for future mass gatherings in the region and beyond, including the FIFA World Cup 2026, the FIFA World Cup 2034, and the annual Hajj pilgrimage.

Materials and Methods

Study Design and Setting

This dual-phase observational study — comprising a retrospective patient-level record review (Phase 1) and a cross-sectional survey of healthcare professionals (Phase 2) — was conducted at Hamad General Hospital (HGH), the largest public tertiary hospital in Qatar and the sole designated receiving centre for emergency and high-acuity care of the non-resident FIFA World Cup 2022 population. The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (Supplementary File 1) [21].

The World Health Organization Eastern Mediterranean Region hosts some of the world's largest recurring mass gatherings, including religious events (the Hajj, Arba'een, Ashura), sporting events, and large cultural and political gatherings [23]. Non-recurring events of major scale — such as the quadrennial FIFA World Cup — are increasingly being hosted across the Region, and pose comparable challenges in managing communicable and non-communicable disease risk, psychosocial strain, extreme weather exposure, and transport- or structure-related incidents [23].

Phase 1: Retrospective Patient Data Review

Study population and eligibility.

This phase reviewed all eligible non-resident patients managed at HGH between 1 October and 31 December 2022, a window chosen to capture the pre-event, active tournament, and immediate post-event periods. For analysis, this window was further divided into three periods: pre-event (1 October–19 November 2022), active tournament (20 November–18 December 2022, corresponding to the official FIFA World Cup Qatar 2022 dates), and post-event (19–31 December 2022). Inclusion criteria were patients aged ≥14 years holding an official HAYA card, FIFA accreditation, or non-Qatari visitor status. Qatari nationals, residents, and patients aged <14 years were excluded, as the study objective was to characterize service delivery for the internationally transient, event-affiliated population specifically. After exclusions, 785 patient encounters met eligibility criteria and were included in the final analysis.

Data sources and extraction.

Data were extracted from three institutional systems to enable triangulation: the CERNER electronic medical record (patient-level clinical documentation), the Medical Command Centre (MCC) dashboard (real-time operational oversight and EMS dispatch coordination), and the FIFA patient-flow tracker

folders maintained specifically during the event for monitoring movement across service nodes. All data were de-identified at the point of extraction and assigned coded identifiers to preserve confidentiality.

Variables.

Demographic variables included age, sex, and nationality (grouped by WHO region). Operational variables included mode of arrival (ambulance, private vehicle, walk-in), referring location (e.g., fan area, stadium, coordination centre, official hotel), and key time intervals along the care pathway: case creation to time of medical arrival (CTM–TOA), case creation to time of admission order (CTM–TOAO), and admission order to room availability (TOAO–Room). Clinical variables included diagnostic category, triage/type of stay (emergency, short stay, long stay), inpatient/outpatient status, isolation requirement, and discharge outcome.

Statistical analysis.

Descriptive statistics (means, standard deviations, frequencies, percentages) summarized patient characteristics and operational patterns. Time-to-event analyses evaluated care-delivery efficiency across the defined operational intervals. Bivariate and multivariate regression models assessed associations between demographic or clinical characteristics and two outcomes of interest: patient waiting time and likelihood of inpatient admission. Analyses were performed in STATA version 17.0 and Microsoft Excel; a two-tailed $p<0.05$ was considered statistically significant.

Phase 2: Cross-Sectional Survey of Healthcare Professionals

Survey objective.

Phase 2 evaluated the experiences and perceptions of healthcare professionals who actively participated in the FIFA Pathway at HGH, covering system functionality, teamwork, communication, staff satisfaction, digital integration, and perceived quality of patient care — complementing Phase 1 with frontline insight into implementation of the centralized care pathway.

Instrument.

Data were collected using the MEGA-OPS questionnaire, a structured instrument previously developed and psychometrically validated by our group among 200 HGH staff (content validity S-CVI/Average = 0.94; three-factor structure explaining 80.1% of variance; Cronbach's alpha 0.96–0.98 across domains) [20]. In its final validated form, the instrument comprises 29 items across three domains, each scored on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), with higher cumulative scores indicating more favourable perceptions. Self-Awareness and Reflection (SAR; 7 items) captures individual perceptions of communication clarity, collaboration, and understanding of the patient-flow process. Interpersonal Support and Supervision (ISS; 10 items) reflects perceptions of leadership,

supervision, training adequacy, inclusivity in decision-making, and professional engagement. Practical Skills and Learning Environment (PSL; 11 items) captures perceptions of operational functionality, digital integration, documentation accuracy, real-time bed/capacity visibility, and streamlining of admissions, discharges, and transfers.

Sampling and data collection.

A total of 403 healthcare professionals were recruited via Microsoft Forms, in-person collection, and telephone interviews, using purposive stratified sampling of staff directly engaged in the FIFA Pathway, including physicians (emergency medicine, internal medicine, surgery), nurses (triage and inpatient units), EMS personnel, case managers, and administrative staff. Staff absent for more than 10 days during the event, or not directly involved in the pathway, were excluded to preserve relevance and recall accuracy. The achieved sample yielded a response rate exceeding 90%.

Statistical analysis.

Survey responses were numerically coded and composite domain scores calculated for each of the three MEGA-OPS domains. Descriptive statistics summarized participant characteristics and domain scores. All analyses were performed in STATA version 17.0; a two-tailed $p<0.05$ was considered statistically significant.

Ethical Considerations

Ethical approval for this study was granted by the Medical Research Center of Hamad Medical Corporation under protocol MRC-01-23-844. For Phase 2, participation was voluntary and governed by an information-sheet-plus-implied-consent model: participants were fully informed of the study's aims, procedures, and confidentiality measures, and completion or submission of the survey (online or in person) was taken as confirmation of informed consent. Participants were free to withdraw at any time without consequence. All Phase 1 data were de-identified at the point of extraction, with no personal identifiers recorded, and confidentiality was maintained throughout. All procedures adhered to the principles of the Declaration of Helsinki [22].

Results

Phase 1: Patient Demographic and Operational Characteristics

Table 1 summarizes the demographic and event-related characteristics of the 785 patients managed at HGH during the study period. Patients were predominantly male (75.3%) with a mean age of 38.2±14.0 years; nearly half were aged 20–34 years (45.2%), followed by 35–49 years (31.0%), while adults aged ≥65 years constituted a smaller proportion (6.1%). By nationality (WHO region), the largest group

originated from the Eastern Mediterranean Region (38.1%), followed by the European Region (18.2%) and African Region (17.1%), reflecting both Qatar's resident population base and the international composition of FIFA attendees.

Most patients were referred from fan areas (31.5%) and stadiums (16.7%), with additional referrals from coordination centres (12.5%) and official hotels (9.7%). The mean time to reach HGH was 13.6±7.1 minutes, and 90.4% of patients arrived by ambulance, with 5.9% arriving by private transport and 3.7% presenting as walk-ins. Consistent with the concentration of tournament activity, 85.7% of presentations occurred during the active World Cup period (20 November–18 December 2022), with 12.1% in the pre-event period and 2.2% in the post-event period (Table 1).

Phase 1: Clinical and Operational Outcomes

Table 2 presents the operational and clinical characteristics of the study population. The mean waiting time from case creation to time of medical arrival (CTM–TOA) was 146.8±298.9 minutes, while the mean time from case creation to admission order (CTM–TOAO) was substantially longer, at 439.8±339.8 minutes, reflecting wide variability in patient flow. Only 10.7% of patients were admitted as inpatients, with the large majority (89.3%) managed without admission; among those admitted, the mean waiting time from admission order to room availability was 236.7±315.9 minutes. Inter-facility transfer was uncommon (4.5%). Most encounters were managed as outpatient visits (63.3%), followed by short-stay inpatient admissions (25.9%) and long-stay inpatient admissions (10.8%), consistent with the distribution by type of stay, in which emergency care predominated (63.8%), followed by short-stay (27.1%) and long-stay (9.1%) care.

The majority of presentations occurred during the night shift (77.5%), aligning with match schedules and fan activity patterns, and isolation was rarely required (2.9% of cases). Nearly all patients were discharged home (97.8%), with very low rates of mortality (0.9%), onward transfer (1.0%), or repatriation (0.1%).

Musculoskeletal conditions were the most common diagnosis (27.7%), followed by ENT disorders (18.2%), gastrointestinal conditions (14.9%), and neurological complaints (14.0%). Cardiovascular (8.3%) and general medical presentations (9.0%) were also notable, while heat-related illness and psychiatric presentations were rare (0.3% each) (Table 2).

Phase 2: Healthcare Workforce Characteristics and MEGA-OPS Domain Scores

Phase 2 included 403 healthcare professionals directly involved in delivering care through the FIFA Pathway at HGH. The largest professional group comprised staff nurses (36.7%), followed by physicians (24.1%), reflecting the central role of frontline clinical staff in pathway execution. Operational and

coordination-focused roles were also represented, including case managers (7.4%), charge nurses (6.9%), head nurses (3.0%), bed management staff (2.2%), and patient flow leads (1.9%). Smaller proportions of respondents were affiliated with centralized command structures, including the Medical Command Centre (1.0%) and the National Health Incident Command Centre (0.7%), while 15.9% reported other supporting or hybrid roles. This distribution reflects broad multidisciplinary engagement across clinical, operational, and command-level functions during the event (Table 3).

Mean composite MEGA-OPS domain scores indicated moderate-to-favourable perceptions across all three measured domains: SAR, 33.7±7.5 (of a possible 35); ISS, 41.6±9.8 (of a possible 50); and PSL, 45.3±11.1 (of a possible 55). These findings suggest generally positive staff perceptions of communication clarity, leadership and supervisory support, and operational and digital functionality during implementation of the centralized FIFA Pathway under high-demand conditions (Table 3).

Discussion

This dual-phase study provides, to our knowledge, one of the first linkages between objective patient-flow data and healthcare-workforce perceptions during a FIFA World Cup, using Qatar's single sole-receiving-centre model as a natural test case. The convergence of the two data streams is itself a key finding: the same system that healthcare workers rated as moderately-to-favourably functioning across communication, leadership, and operational domains also produced measurable outcomes consistent with that perception — high outpatient throughput, low inpatient admission, and a 97.8% home-discharge rate with minimal mortality.

Large international sporting events place heavy and sometimes unpredictable pressure on host healthcare systems, driven by the sudden arrival of large visitor volumes and elevated crowd density [3]. Qatar 2022 was distinctive as the first World Cup hosted in the Middle East, and it was supported by centralized, proactive healthcare planning led by HMC. The dedicated FIFA Pathway at HGH was designed to organize triage, smooth patient movement, and make efficient use of hospital resources, while Qatar's experience managing COVID-19 improved underlying readiness through established command structures, digital health systems, and a highly multilingual healthcare workforce [14, 15]. These measures are broadly consistent with international guidance on healthcare planning for mass gatherings [7].

Most patients treated during the tournament were young men with a mean age of 38 years, a pattern consistent with prior mass-gathering literature, since younger attendees are more likely to travel to and move actively around such events [24]. The predominance of patients from the Eastern Mediterranean and African regions reflects both Qatar's resident population base and the global composition of FIFA's international fan base. Multilingual liaison officers and centralized command structures likely helped mitigate the language and cultural barriers known to affect access to, and quality of, care at international mass gatherings [4].

The emergency medical response functioned efficiently: over 90% of patients arrived by ambulance, with a mean transport time of approximately 14 minutes, reflecting Qatar's compact urban geography, well-developed ambulance services, and coordinated traffic management. The predominance of night-shift presentations, aligned with match timing and fan activity, underscores the importance of aligning staffing models with anticipated peak-demand windows during major events [25].

Several contextual factors likely limited the severity of the caseload observed. Temporary school and university closures during the tournament reduced routine domestic healthcare demand and traffic congestion, freeing capacity for event-related care. Hosting the tournament in the Qatari winter, combined with air-conditioned stadiums and transport infrastructure, substantially reduced the risk of heat-related illness relative to earlier warm-weather mass gatherings [26]; correspondingly, heat stroke accounted for only 0.3% of diagnoses in our cohort. Strict alcohol and narcotics regulations, robust security and crowd-control measures, and comprehensive entry screening likely also contributed to the low proportion of trauma- and substance-related presentations, alongside free public transport and food-safety oversight across event venues.

Only a small proportion of patients required inpatient admission (10.7%), consistent with effective triage and appropriate use of outpatient and short-stay pathways to absorb the bulk of demand. However, the substantially longer interval between admission decision and room availability (mean 236.7 minutes) than between case creation and initial medical assessment (mean 146.8 minutes) points to bed management, rather than initial triage or ambulance response, as the principal operational bottleneck in the pathway — a pattern also reported in other large mass-gathering health systems, where planning has historically emphasized patient arrival over internal hospital flow [27]. Despite this, the FIFA Pathway sustained safe, continuous care throughout the patient journey, and the low isolation rate (2.9%) suggests that communicable-disease containment measures, while available, were needed only infrequently.

The dominance of musculoskeletal, ENT, gastrointestinal, and neurological presentations is consistent with global evidence that minor injuries and common acute illnesses — rather than major trauma — dominate the caseload at mass gatherings [24], and mirrors the case-mix reported in a concurrent primary care evaluation conducted during the same tournament [28]. This pattern also aligns with sports-medicine literature from the tournament itself: athlete-focused surveillance similarly reported a low burden of severe trauma alongside high utilization of diagnostic imaging services [29], and video-based analysis of on-pitch head-injury situations found that most potential head injuries required only brief pitch-side assessment rather than escalation to hospital-based care [30].

Interpreted alongside the Phase 2 findings, these patient-flow results suggest that the preparedness measures reflected in favourable MEGA-OPS scores for communication (SAR) and leadership/supervision (ISS) plausibly contributed to the operational outcomes observed in Phase 1: rapid ambulance response, appropriate triage, and a high discharge rate. The comparatively lower relative performance implied by bed-allocation delays is likewise consistent with the Practical Skills and

Learning Environment (PSL) domain, which specifically captures perceptions of real-time bed and capacity visibility — an area healthcare workers may have recognized as a relative weak point even amid broadly positive perceptions of the pathway overall. This convergence between workforce perception and system performance data reinforces the value of pairing subjective and objective evaluation methods when assessing mass-gathering health system readiness, rather than relying on either data stream alone [18–20].

Compared with other large mass gatherings such as the Hajj pilgrimage and the Kumbh Mela, Qatar's response benefited from advanced digital systems, centralized leadership, and climate-aware planning within a comparatively compact and resource-rich urban setting [31, 32]. The successful healthcare response also depended on collaboration across multiple government sectors: the Ministry of Public Health provided overall policy leadership, HMC managed clinical operations, and the Ministries of Municipality, Interior, Transport, and Sports and Youth contributed sanitation and food safety, security and crowd control, mobility infrastructure, and event coordination, respectively. This intersectoral collaboration, combined with substantial investment in healthcare infrastructure and free medical services and transport for HAYA cardholders and visitors, was a critical enabler of the outcomes observed [33].

The organization of healthcare services for the FIFA World Cup 2022 also occurred during a prolonged period of global recovery from the COVID-19 pandemic, during which healthcare systems continued to manage residual infection-prevention requirements, workforce fatigue, and sustained pressure on emergency and inpatient services [34, 35]. Delivering a large-scale international mass gathering under these conditions added a further layer of operational complexity to preparedness planning, and the patient-flow performance observed here suggests that structured leadership, established communication pathways, and workforce training developed during the pandemic response may have supported system resilience under this compounded demand [35].

Implications for Future Mass Gatherings

The lessons from Qatar 2022 are directly relevant to planning for FIFA 2026 (Canada, Mexico, and the United States), FIFA 2034 (Saudi Arabia), and recurring religious mass gatherings such as the Hajj. Future preparedness efforts should prioritize scalable bed-management and real-time capacity-visibility systems specifically, given that this was the principal bottleneck identified here; flexible, demand-aligned staffing models, particularly for night-shift and peak-activity periods; integrated, digitally supported care pathways spanning pre-hospital and hospital services; and continued investment in multilingual, culturally responsive workforce training. Strong coordination between pre-hospital and hospital services, and across government sectors more broadly, remains essential to reducing delays and sustaining patient outcomes during future large-scale events.

Limitations

Several limitations should be considered when interpreting these findings. First, Phase 1's retrospective design relied on routinely collected data, which may not fully capture the complexity of real-time clinical and operational decision-making, informal workarounds, or undocumented delays; variation in data completeness across the three source systems may also have introduced some information bias, despite efforts to triangulate across sources. Second, the study did not include patient-reported outcomes such as satisfaction, perceived quality of care, or cultural sensitivity, which are important complementary indicators for internationally diverse mass-gathering populations. Third, Phase 2 relied on healthcare professionals' self-reported perceptions via the MEGA-OPS instrument rather than direct observation of workflows or independent performance measures, so staff perceptions may not fully capture actual system performance, and the two phases, while interpreted together, were not linked at the individual patient-provider level. Fourth, this study did not directly measure COVID-19–specific clinical indicators; however, the patient-flow and service-utilization metrics analyzed remain valid indicators of healthcare-system performance under the residual pandemic-related operational constraints present during the study period. Finally, the study was conducted at a single tertiary hospital functioning as a sole national receiving centre, which may limit generalizability to healthcare settings with different resources, patient populations, multi-site models, or organizational structures. Future research should employ prospective, multi-centre designs incorporating patient-reported outcomes, real-time operational indicators, and direct workflow observation to build on these findings.

Conclusion

The FIFA World Cup Qatar 2022 demonstrated that a large-scale mass gathering can be safely managed through a centralized, single-receiving-centre model supported by proactive planning and integrated healthcare pathways. Despite a substantial and concentrated surge in demand, the FIFA Pathway implemented at Hamad General Hospital enabled timely triage, efficient patient flow for the large majority of presentations, and a high rate of safe discharge with minimal adverse outcomes. Preparedness carried over from Qatar's COVID-19 response — including established command structures, digital integration, and a flexible, multilingual workforce — appears to have supported this performance, complemented by efficient ambulance services, seasonal and climate-aware planning, and strong intersectoral collaboration across health, transport, security, and municipal services. Healthcare workers' own perceptions of communication, leadership support, and operational functionality, captured using the validated MEGA-OPS instrument, were broadly consistent with these objective outcomes, while also pointing to bed-allocation delays as the clearest concrete target for improvement. These findings provide actionable, evidence-based guidance for healthcare planning at future international sporting, religious, and cultural mass gatherings, including FIFA 2026, FIFA 2034, and the Hajj.

Declarations

Ethics approval and consent to participate: This study was approved by the Hamad Medical Corporation Institutional Review Board / Medical Research Center (protocol MRC-01-23-844). Participation in the Phase 2 survey was voluntary; an information sheet describing the study's purpose, procedures, and data

confidentiality measures was provided to all participants, and completion and submission of the survey was considered provision of informed consent, in accordance with institutional and international ethical standards. All Phase 1 data were de-identified at the point of extraction. All procedures adhered to the principles of the Declaration of Helsinki.

Consent for publication: Not applicable.

Availability of data and materials: The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests: The authors declare that they have no financial or personal relationships that could have inappropriately influenced this work.

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Authors' contributions: IA and AEO conceptualized the study. RK and IA collected the data; KS and AEO analyzed the data. IA, AEO, RK, and KS drafted the initial manuscript, which was critically revised for important intellectual content by ID and MAM. All authors read and approved the final manuscript.

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Tables

Table 1. Demographic and event-related characteristics of patients managed at Hamad General Hospital during the FIFA World Cup 2022 (N=785)

Demographic characteristic	Frequency, n (%) or Mean±SD
Age, years, mean±SD	38.2±14.0
Age group, years	
<19	26 (3.3)
20–34	353 (45.2)
35–49	242 (31.0)
50–64	112 (14.3)
≥65	48 (6.1)
Sex	
Male	591 (75.3)
Female	194 (24.7)
Nationality (WHO region)	
Eastern Mediterranean Region (EMRO)	299 (38.1)
European Region (EURO)	143 (18.2)
African Region (AFRO)	134 (17.1)
South-East Asian Region (SEARO)	92 (11.7)
Region of the Americas (AMRO)	74 (9.4)
Western Pacific Region (WPRO)	32 (4.1)
Other	11 (1.4)
Referring location	
Fan Area	247 (31.5)
Stadium	131 (16.7)
Coordination Centre	98 (12.5)
Official Hotels	76 (9.7)
Other	84 (10.7)
Team Hotel	42 (5.4)
Media	35 (4.5)
Training Facility	25 (3.2)
PHCC	24 (3.1)

Demographic characteristic	Frequency, n (%) or Mean±SD
Port of Entry	15 (1.9)
Event Hubs	5 (0.6)
Fan Villages	3 (0.4)
Time to reach HGH, minutes, mean±SD	13.6±7.1
Mode of arrival	
Ambulance	710 (90.4)
Private transport	46 (5.9)
Walk-in	29 (3.7)
World Cup period	
Pre-event (1 Oct–19 Nov 2022)	95 (12.1)
During event (20 Nov–18 Dec 2022)	673 (85.7)
Post-event (19–31 Dec 2022)	17 (2.2)

Table 2. Operational and clinical characteristics of patients managed at Hamad General Hospital during the FIFA World Cup 2022 (N=785)

Epidemiological/operational characteristic	Frequency, n (%) or Mean±SD
Waiting time, case creation to medical arrival (CTM–TOA), minutes	146.8±298.9
Waiting time, case creation to admission order (CTM–TOAO), minutes	439.8±339.8
Admitted as inpatient	
Yes	84 (10.7)
No	701 (89.3)
Waiting time, admission order to room availability (TOAO–Room), minutes	236.7±315.9
Inter-facility transfer	
Yes	35 (4.5)
No	750 (95.5)
Length of stay	
Outpatient	497 (63.3)
Inpatient, short stay	203 (25.9)
Inpatient, long stay	85 (10.8)
Type of stay	
Emergency	491 (63.8)
Short stay	209 (27.1)
Long stay	70 (9.1)
Shift	
Night shift	608 (77.5)
Morning shift	177 (22.5)
Isolation required	
No	757 (97.1)
Yes	23 (2.9)
Discharge status	
Discharged home	768 (97.8)
Discharged, deceased	8 (0.9)

Epidemiological/operational characteristic	Frequency, n (%) or Mean±SD
Transferred	7 (1.0)
Discharged, repatriated	1 (0.1)
Still admitted at data cut-off	1 (0.1)
Diagnosis classification	
Musculoskeletal	216 (27.7)
ENT	142 (18.2)
Gastrointestinal	116 (14.9)
Neurological	109 (14.0)
General medicine	70 (9.0)
Cardiovascular	65 (8.3)
Genitourinary	19 (2.4)
Dermatological	17 (2.2)
Ophthalmic	11 (1.4)
Road traffic accident	6 (0.8)
Dental	3 (0.4)
Heat stroke	2 (0.3)
Psychiatric	2 (0.3)
Other	2 (0.3)

Table 3. Characteristics of healthcare professionals involved in the FIFA Pathway and MEGA-OPS domain scores (N=403)

Factor	Level	n (%) or Mean (SD)
Role	Staff nurse	148 (36.7)
	Physician	97 (24.1)
	Other	64 (15.9)
	Case manager	30 (7.4)
	Charge nurse	28 (6.9)
	Head nurse	12 (3.0)
	Bed management	9 (2.2)
	Patient Flow lead	8 (1.9)
	MCC member	4 (1.0)
	NHICC member	3 (0.7)
MEGA-OPS domain scores	Self-Awareness and Reflection (SAR)	33.7 (7.5)
	Interpersonal Support and Supervision (ISS)	41.6 (9.8)
	Practical Skills and Learning Environment (PSL)	45.3 (11.1)

Abbreviations: MCC, Medical Command Centre; NHICC, National Health Incident Command Centre.

Figures

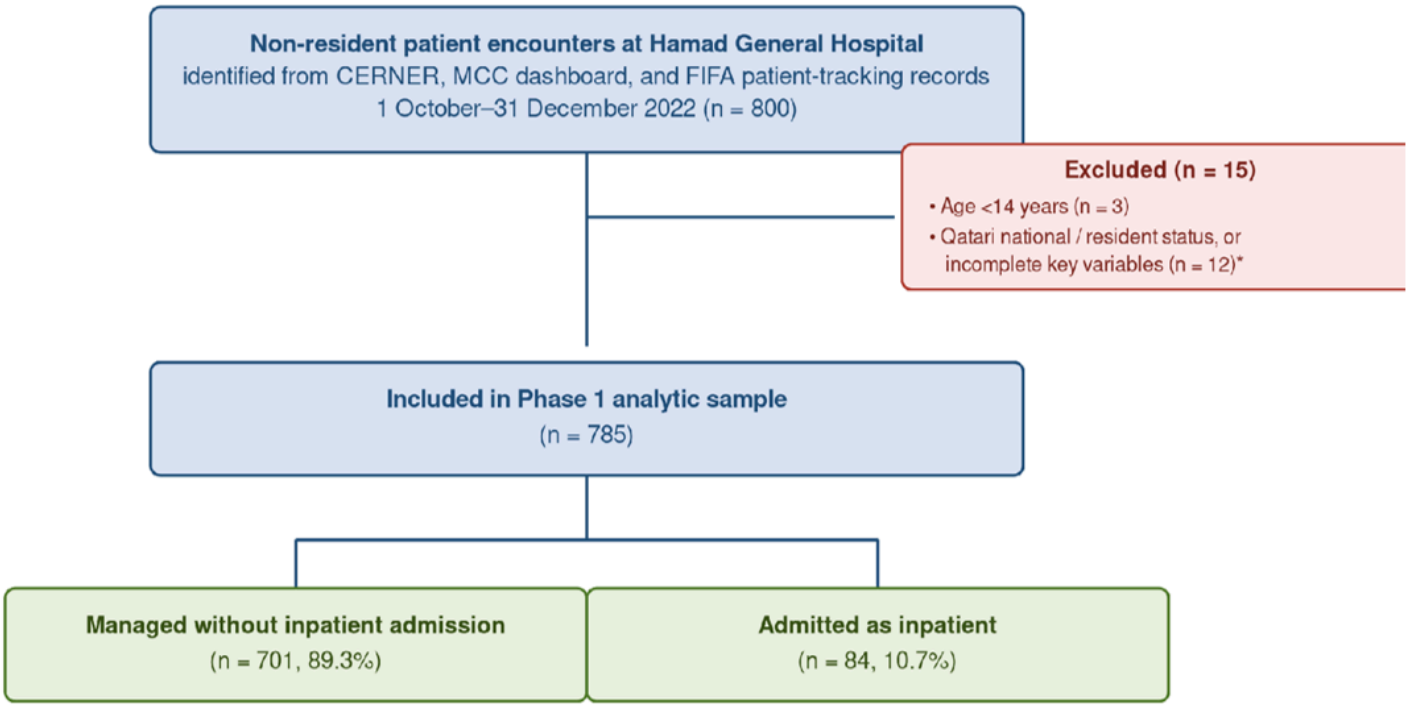
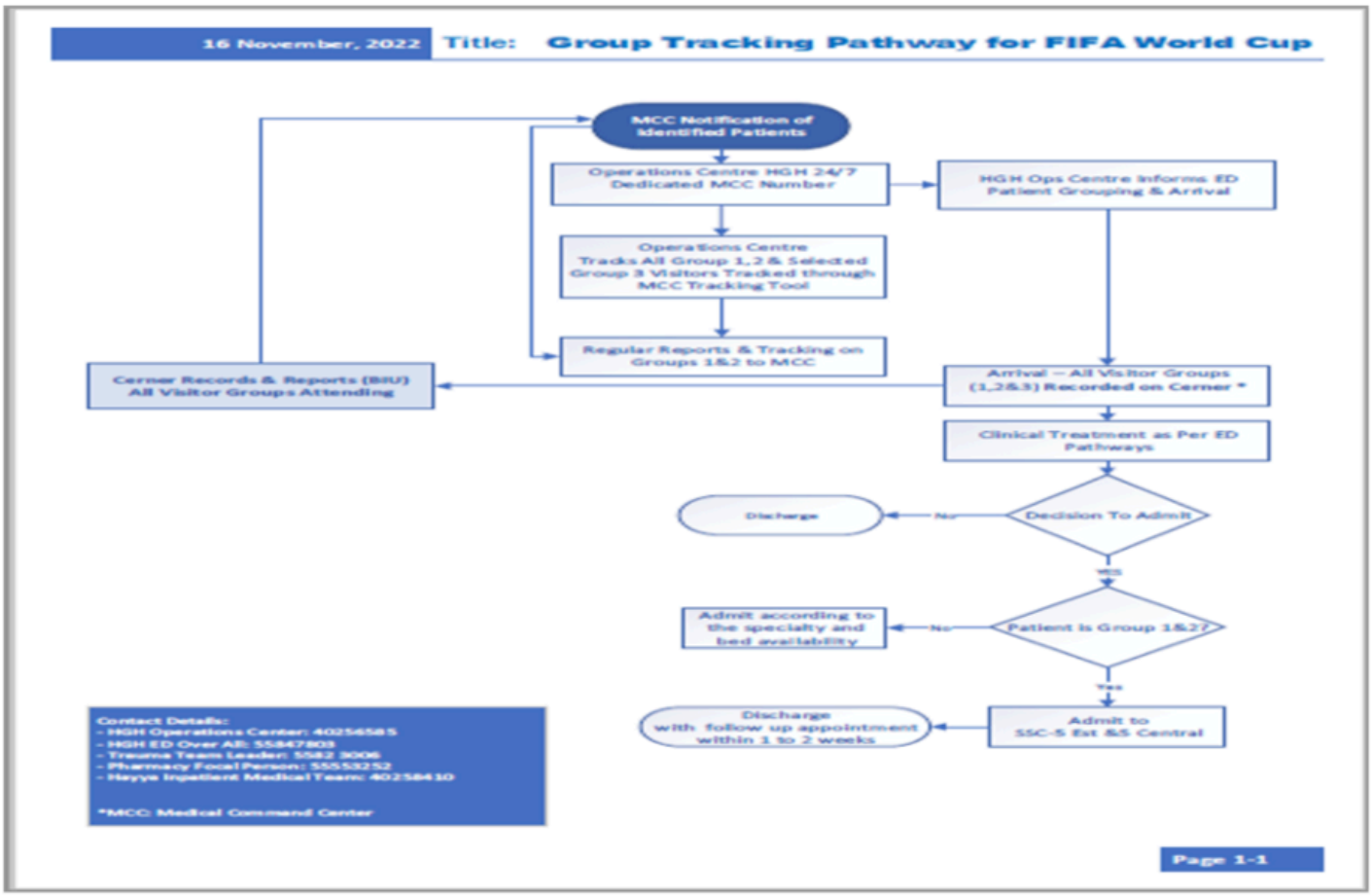


Figure 1

Patient data-extraction flow diagram for Phase 1, showing the number of non-resident patient encounters identified at Hamad General Hospital (n = 800), excluded with reasons (n = 15: age <14 years, n = 3; Qatari national/resident status or incomplete key variables, n = 12), and included in the final analytic sample (n = 785), with the resulting split between patients managed without inpatient admission and those admitted as inpatients.



Panel B. Post-Discharge Outpatient Appointment Pathway



Panel C. Group Tracking Pathway for FIFA Walk-In Attendee

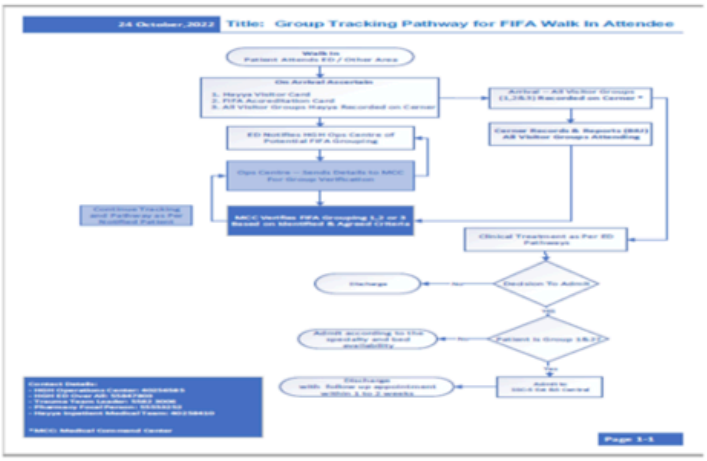


Figure 2

The FIFA Pathway at Hamad General Hospital. (A) General Group Tracking Pathway for FIFA World Cup visitor groups (Groups 1–3), from Medical Command Centre (MCC) notification through arrival, clinical treatment, and disposition. (B) Post-discharge outpatient department (OPD) appointment pathway for FIFA patients requiring follow-up care. (C) Group Tracking Pathway for FIFA walk-in attendees, from arrival and MCC verification of visitor grouping through clinical treatment and disposition. Source: institutional

operational diagrams, Hamad Medical Corporation (16 November 2022, 29 November 2022, and 24 October 2022, respectively).