BMJ Open

# Perceptions of postoutbreak management by management and healthcare workers of a Middle East respiratory syndrome outbreak in a tertiary care hospital: a qualitative study

Bandar Abdulmohsen Al Knawy,[1] Hanan M F Al-Kadri,[2] Mahmoud Elbarbary,[3] Yaseen Arabi,[1] Hanan H Balkhy,[4] Alex Clark[5]

**To cite:** Al Knawy BA, Al-Kadri HMF, Elbarbary M, *et al*. Perceptions of postoutbreak management by management and healthcare workers of a Middle East respiratory syndrome outbreak in a tertiary care hospital: a qualitative study. *BMJ Open* 2019;**9**:e017476. doi:10.1136/bmjopen-2017-017476

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2017-017476).

Received 25 April 2017
Revised 24 October 2018
Accepted 11 March 2019



For numbered affiliations see end of article.

**Correspondence to**
Dr Bandar Abdulmohsen Al Knawy; knawyb@ngha.med.sa

## ABSTRACT

**Objectives** This study examines perceptions of the operational and organisational management of a major outbreak of Middle East Respiratory Syndrome (MERS) caused by a novel coronavirus (MERS-CoV) in the Kingdom of Saudi Arabia (KSA). Perspectives were sought from key decision-makers and clinical staff about the factors perceived to promote and inhibit effective and rapid control of the outbreak.

**Setting** A large teaching tertiary healthcare centre in KSA; the outbreak lasted 6 weeks from June 2015.

**Participants** Data were collected via individual and focus group interviews with 28 key informant participants (9 management decision-makers and 19 frontline healthcare workers).

**Design** We used qualitative methods of process evaluation to examine perceptions of the outbreak and the factors contributing to, or detracting from successful management. Data were analysed using qualitative thematic content analysis.

**Results** Five themes and 15 subthemes were found. The themes were related to: (1) the high stress of the outbreak, (2) factors perceived to contribute to outbreak occurrence, (3) factors perceived to contribute to success of outbreak control, (4) factors inhibiting outbreak control and (5) long-term institutional gains in response to the outbreak management.

**Conclusion** Management of the MERS-CoV outbreak at King Abdulaziz Medical City-Riyadh was widely recognised by staff as a serious outbreak of local and national significance. While the outbreak was controlled successfully in 6 weeks, progress in management was inhibited by a lack of institutional readiness to implement infection control (IC) measures and reduce patient flow, low staff morale and high anxiety. Effective management was promoted by greater involvement of all staff in sharing learning and knowledge of the outbreak, developing trust and teamwork and harnessing collective leadership. Future major IC crises could be improved via measures to strengthen these areas, better coordination of media management and proactive staff counselling and support.

## Strengths and limitations of this study

- This study examines stakeholder perspectives of the factors contributing to or detracting from successful infection control management of a serious Middle East Respiratory Syndrome caused by a coronavirus (MERS-CoV) outbreak.
- The MERS-CoV outbreak was of international significance due to its high mortality.
- The study was independently conducted and included perspectives of key stakeholders, managers and frontline health care worker and focused on the perceptions of key stakeholder participants.

## ARTICLE SUMMARY

This work can guide organisational actions for the control of rare infectious outbreaks in advanced healthcare settings. This research was conducted by independent researchers with participants well-placed to provide insights into the management of the outbreak. The lessons learnt from this work are:

- The outbreak was perceived to be serious and caused by inadequate readiness of the facility to implement infection prevention control guidelines effectively.
- Management of the outbreak was inhibited by a lack of institutional readiness to implement IC measures and reduce patient flow, low staff morale and high anxiety.
- Effective management was promoted by greater involvement of all staff in sharing learning and knowledge of the outbreak, developing trust and teamwork and harnessing collective leadership.
- Future major IC crises could be improved via measures to strengthen these areas,

better coordination of media management and proactive staff counselling and support.

## INTRODUCTION

How can decision-makers and health professionals in large healthcare organisations better manage major infection outbreaks? This is important because rapid and widespread pandemics pose a high threat to life, health systems and economies locally, nationally and globally. Middle East Respiratory Syndrome (MERS) is caused by one such coronavirus (MERS-CoV). It leads to severe acute respiratory infection with multiorgan failure and has a 65% mortality rate.[1 2] MERS-CoV outbreaks have now occurred in 26 countries across the Middle East, Africa, Europe, Asia and North America.[2–4]

Successful management of MERS-CoV outbreaks is very challenging because the infection occurs most commonly in healthcare workers (HCWs)[2] but knowledge of both the causes of the virus and its treatment is still limited.[3–6] Most outbreaks have been attributed to low-adherence to infection control (IC) practices, crowded emergency departments (ED) and slow responsiveness to outbreaks.[7] Consequently, to assist organisational preparedness,[8 9] more knowledge is needed to guide future management of MERS-CoV infection outbreaks.

This study focuses on a major outbreak of the MERS-CoV which occurred at the King Abdulaziz Medical City-Riyadh (KAMC-R) in June 2015[10]; a large teaching hospital and university centre in the Kingdom of Saudi Arabia.[11] The outbreak resulted in 130 cases of infection (53% mortality rate); the outbreak directly or indirectly involved 9000 HCWs and all major departments at the institution (table 1). A comprehensive objective analysis of this outbreak[10] identified that one third of infection cases were in HCWs, with about half of these cases (54%) occurring in ED staff (mean age: 37 years; 77% female) with no deaths.[10] Infected patients (non-HCWs) had a median age of 66 years; 65% male.[10] Symptom onset in the last infected case was 28 August 2015; the end of the outbreak was on 28 June 2015[10] following two 14-day incubation periods without new cases

Despite the severe and widespread risks that MERS-CoV poses, little research on the virus exists to guide its management in crises situations. While health professionals' perceptions of risk[12] and psychological reactions[13] to similar respiratory viruses have been explored, to our knowledge, this is the first study of stakeholder perspectives of the factors promoting and inhibiting effective infection management of a widespread MERS-CoV outbreak. Generated from the world's second largest recorded outbreak of MERS-CoV to date, this study examines key stakeholder perspectives of the factors promoting and inhibiting effective IC. As an intense study of a single 'complex' outbreak, this research seeks to provide useful lessons for the management of future similar outbreaks.

## METHODS

Qualitative study using process evaluation of a single complex case[14 15] was used to identify key stakeholder perceptions of the processes, lessons and insights arising from the successful management of the MERS-CoV outbreak.[15] Data were collected by authors (HMFA-K) and (AC), through semi-structured individual interviews and focus groups in May 2016.

### Semi-structured and focused group interviews

Twenty-eight 'key stakeholder' participants took part in the study. Semi-structured individual key informant qualitative interviews were undertaken with 9 senior leaders/decision: each responsible for one or more facets of the major management decisions during the outbreak. Additional data were collected with 19 frontline HCWs (10 nurses and 9 physicians) who were each in direct patient care contact with MERS-CoV patients during the outbreak. Recruitment was undertaken via volunteer quota sampling of decision-makers and staff from across the hospital. Data were collected in the clinical institution by independent researchers (AC) and (HK), with no direct involvement with the site, with schedules developed from past literature, approaches to learning organisations, and the respective role(s) of participants (online supplementary appendix 1). Interviews were audio-recorded via a digital device with data transcribed immediately after data collection. Each interview/group lasted between 45 and 100 min; transcripts included non-verbal behaviour. Prior to the interviews, institute revenant written documentation such as memorandums and committee meeting minutes was analysed to direct the questions posed during the qualitative data collection (table 1, online supplementary appendix 1).

### Data management

Qualitative data using process evaluation generates insights from key stakeholders on contributions to, and factors affecting key outcomes or processes, in organisations or interventions.[14 15] Interview transcripts were analysed manually to determine common themes using recognised principles of qualitative research.[16] For each interview, codes, subthemes and themes were then identified and subsequently refined to avoid redundancy and guarantee accuracy via a cyclical analytical process by two of the investigators.[16] The analysis moved back and forth between the interviews to ensure the finalised analysis was completed.

Rigour was maintained via a variety of recognised techniques.[16] Member checking of the qualitative data enhanced credibility and transferability: the results were presented to 13 participants to ensure the findings were comprehensible and had resonance. Participants concurred with the proposed results. Peer debriefing was used in which a second researcher analysed a random selection of interviews to ensure themes were understandable. No major changes to the analysis arose from this debriefing.

**Table 1** Actions of different departments, during and after the 2015 MERS-CoV outbreak at KAMC-R

| Transformed occurred | Transformation description |
|---|---|
| IC transformation<br>▶ Establishing a strict triage process for MERS-CoV<br>▶ Two teams were formulated<br>▶ Extensive IPC training programme | In addition to the IDEP plan, which was established in 2013 with the detailed MERS-CoV flowcharts, a more strict and explicit triage process was established to ensure early identification of suspected MERS-CoV cases. This was added as the first layer of the patient triage process and implemented in the newly established drive-through system to the ED, and at the entrances of the ACC. Once a patient has entered the main ER, a second screening would take place to identify any possible cases that may have been missed by the first process.<br>Two new teams were formed: CMT, a medical team managing all admitted patients with respiratory illness and CPRT, an outreach team responsible to ensure proper location, testing, transfer, discharge and consultation for suspected and confirmed MERS cases.<br>A two-phase programme aimed to train, assess and audit IC practices of HCWs was implemented. Phase I was launched on 28 September 2015, and designed to ensure competence in basic IPC knowledge and practice. The second phase was designed to address sustainability of HCWs' certification and to ensure accountability. Fulltime IPC observer(s) and trained DCNs were assigned for programme monitoring. |
| CCC activation | This central committee was activated as part of the IDEP phase II process, and is chaired by the Executive Director, Medical Services. Members include: CEO, CMO, ED IC department and heads of most concerned medical, media, security, logistics and nursing departments. The committee charges have allowed the meeting team to take major decisions and implement them immediately bypassing the usual routine hierarchy process. |
| ED and patient triaging transformation | ED staff and the military police have controlled all ED entrances, and access was restricted to ED employees. The MERS-CoV plan was implemented aiming to avoid any future occurrences of any infectious diseases. Major changes in the ED workflow were implemented. A drive-through was established at the entrance of the ED with 3 lanes and f4 windows per lane, manned by trained unit assistants to implement the initial triage process. Second, was the establishment of an 18 respiratory-isolation room facility for which patients with a suspected respiratory illness would be isolated and evaluated. Third, was a reduction in patient boarding time. |
| IM and admission departments transformation | IM department and the bed coordination unit have facilitated patient admissions. The bed coordination unit was turned into a department chaired by a senior IM physician. A new IM division was established and staffed to manage all general IM cases and shorten patient boarding time in the ED. |
| Establishment of a call centre | Established in response to almost complete closure of the institution, this centre has served to respond to calls from patients and their families, reschedule/direct patients' appointments at the ACC, reschedule/direct surgeries and admissions in all clinical departments. |

ACC, ambulatory care centre; ICU, intensive care unit; CCC, Command and Control Committee; CEO, Chief Executive Officer; CMO, Chief Medical Officer; CMT, Corona Management Team; CPRT, Corona Prevention Response Team; ED, emergency department; HCW, healthcarecare worker; IC, infection control; IDEP, infection diseases epidemic plan; IM, internalmedicine; IPC, infection prevention and control; KAMC-R, King Abdulaziz Medical City-Riyadh; MERS-CoV, Middle East Respiratory Syndrome caused by a coronavirus.

### Patient and public involvement

The research question and design were informed by the high mortality and severe morbidity resulting of MERS-CoV. Neither patients nor public were involved in the study; answering the research question does not require their participation.

## RESULTS

Data analysis identified 5 major themes and 15 suthemes. The major themes were: 1) the high stress of the outbreak, 2) factors perceived to contribute to outbreak occurrence, 3) factors perceived to contribute to success of outbreak control, 4) factors inhibiting outbreak control and 5) long-term institutional gains in response to the outbreak management (table 2). In the results, themes are presented in **bold** and subthemes are presented in ***italic bold*** typing.

### The high stress of the outbreak

All participants reported that the MERS-CoV outbreak was seen to constitute an episode of the most pressing and serious clinical significance to the organisation and country. Consistently across interviews, it was described in such terms as a ***serious and straining situation*** and a ***situation that carries national and international significance***.

Frontline HCWs and senior decision-makers alike not only perceived this high gravity, but also experienced extremely high and diverse demands personally (***a very demanding situation***). Throughout the interviews, participants described the outbreak as being a sustained period of severe and sustained 'tension', 'doubts', 'challenges', 'fear' and 'anger'. Frequent visits, communications and collaborations from external regulatory agencies (such as the Saudi Ministry of Health, the US Center for Disease Control and Prevention and the WHO), were perceived to be useful but also compounded these stresses.

The perceived seriousness of the outbreak was reported to motivate staff to expend maximum effort to assist in its management. However, the high levels of stress were exacerbated by a pervading sense that controlling the outbreak involved ***hard and uncertain progress***. In the midst of the outbreak, both how it would progress and the future were seen to be very unclear.

### Factors perceived to have contributed to wide occurrence of the outbreak

Strong consensus existed among participants that the organisation's ***growing reliance on emergency department boarding*** was the main contributor to the outbreak. While some participants lamented that this build up was 'permitted' by senior decision-makers to occur over the long-term, other participants saw other upstream factors as also being influential, notably ***inadequate implementation of Infection Prevention and Control (IPC) guidelines***. Indeed, poor recognition of the importance of IPC principles across the organisation was perceived to be compounded by the high demands placed on the ED by the large patient population. Other more upstream factors seen to contribute to the outbreak included: high trust patients had for the National Guard Health Affairs, the relative lack of primary care services, problems associated with patient flow across the city, poor communication and teamwork between the city hospitals, and a lack of pre-emptive national planning to allow hospitals across different sectors to share the burden of the growing city population.

### Factors perceived to have contributed to the success of outbreak control

Throughout this challenging situation, ***teamwork and collaborative management*** were seen to be pivotal. There was a sense of close alignment between both decision-makers and frontline HCWs in management priorities. The approach of senior management to the situation was perceived by participants as being open, without blame or 'finger-pointing'. Indeed, managers were seen to have focused on empowering HCWs to work collaboratively to address the outbreak, involving staff in outbreak control and stimulating staff resilience and teamwork. In this way, the dominant culture was perceived by staff to be one of ***collective leadership practice*** (table 1) with leaders being seen to have practiced high levels of availability, visibility, empowerment of middle management and strong links with frontline staff during the height of the outbreak.

Key factors seen to contribute to this sense of collaborative culture included: the existence of a clear shared-vision across staff of the high priority outbreak control measures, the high frequency of meetings of decision-makers involved in the outbreak control (twice daily), rapid and efficient decision-making, involvement of all the right units and decision-makers in decisions, and a high level of accountability. Having a centralised Command and Control Centre committee was seen widely to facilitate openness with high accountability, strategic utilisation of team diversities and strong mutual support. The success in controlling the outbreak in a relatively short time fostered a widespread sense of pride among those working in the organisation. Collectively, these measures served to ***improve mutual trust between front liners and top management***.

### Factors inhibiting outbreak control

Factors perceived to inhibit management of the outbreak were mostly related to initial poor management practices and the negative and compounding effects of media reporting and high stress. The organisation was perceived to be acutely and chronically slow in responding to the outbreak. For example, organisational responses from management to the outbreak was perceived to be relatively slow compared with the rapid speed with which the infection spread. Moreover, despite references to high management transparency, some staff cited that ***poor staff orientation and management ambiguity*** contributed to staff being isolated and unclear about the decisions and measures being adopted by senior management to

**Table 2** Extracts from study data themes and subthemes

| Study themes/subthemes | Quotes | Interview no (interviewee level) |
|---|---|---|
| Stress of the outbreak | | |
| 1. A serious and straining situation<br>2. Situation that carries national and international significance | 'We got a hit…the system failed us. Maybe we overestimated our capacity. Maybe we underestimated an unknown enemy…. We were angry about what happened… There was a lot of elements that happened at that time. So we were…feeling isolated as an organization …To be honest, it – it brought the best in us and the worst in us. The best in us in term of our resilience and our ability to cope. The worst in us is our weaknesses and our insecurities and our dealing with each other… And there was a lot of international pressure on us…there was a lot of international pressures. You can understand it doesn't affect National Guard. It affects everything…. So there was a lot of pressure at that time.' | Transcript 1 (decision-maker) |
| 3. A very demanding situation | ' A lot of the organization do not really – knew what was going on. That we were meeting at nine o'clock in the morning, we're meeting at three o' clock every day… every day, including weekends. No rest at all.' | Transcript 1 (decision-maker) |
| 4. Hard and uncertain progress | ' We were worried for the staff and we were worried for the patients. And during that time, we were ah, doing five hundred um… tests. And every day, we come in. And we see the numbers. And so, today we tested 15 positives. Tomorrow, 20. And we were saying, when do we hit an inflection point? When these numbers goes down? And it goes down for a bit, and it comes up. And every time, you just hope to God that this is it… So the morale was going up and down.' | Transcript 1 (decision-maker) |
| 5. Teamwork and collaborative management requirement | ' We took it very seriously. We know the magnitude. We know the impact of it. We know how this affects the, the patient care and how this affects the reputation of the organization, affects everything. And…the public image and all of this has to be addressed to the Minister. We said (means all leaders) however, it is, it is, it's a must that we….should do it. ….In spite of all of this stress and difficulties we felt that we need to be focused and address issues scientifically. At the same time you know we have to support people who are working at the frontline. We have to do that, we have to really be there and we know that they are very stressed.' | Transcript 5 (decision-maker) |
| Factors perceived to contribute to outbreak occurrence | | |
| 1. Growing reliance on ED boarding | ' ….The organization is well known in the country for many success stories and…that basically put some pressure on the organization of people asking to be treated here…. Third thing is….our location here as the only big hospital in the East of Riyadh… Because of the large number and because of the expertise in managing the casualties…Those factors basically, I mean resulted in a huge number of … boarding patients in the ED…… ' | Transcript 7 (decision-maker) |
| 2. Inadequate implementation of IPC guidelines | ' …It's not something you want to see… And when you know, it's because someone didn't wash their hands. That's the bit that killed me. Something simple, it wasn't that we didn't have a Da Vinci (Robotic surgery) in the OR. It's because they didn't wash their hands.' | Transcript 14 (frontline HCW) |
| Factors perceived to contribute to success of outbreak control | | |
| 1. Collective leadership practice | ' The organization is well staffed with very smart, dedicated individuals – across all spectrums … And I think that really was what helped out. Middle management, chairmen of departments…. they rose to the equation…. And I think there was tremendous amount of work that was done by some of the Chairmen. I think…it was really… hard on lot of them…. We just felt, we're not blaming anyone, we just needed one clear goal that we need to get out of it quickly, quickly, as quick as possible…. I think people wanted to prove that they are, they are, they are good. I learned that being close to the management being accessible to management, to to frontline was… good…We hopefully have led from the, form the front.'<br>'When we start to see the CEO doing round in the ED, almost every day….and so we can contact him. So you can talk with him. So you can address the problem directly. So he is doing his rounds almost on a daily basis…And he meets with us or the heads of the units and ask, 'so, how can I help you in this unit?'<br>' There was leadership…the commitment came out. That is the first time that we saw each other twice daily. We were spending time together more than we spend with our families. So every day, I will see Doctor ___ [Leader], every day I will see Doctor ____ [Leader]. So we were always there… So there was – there was a lot of collegiality that – that was really built. Ah, storming led to performing. Meaning that: okay, yes, we had differences of opinions, but at the end of the day, we had to come up with decisions. … '<br>' There was flatness (to) the decision tree – it did not really need a committee to approve it. It used to be one meeting, to two meetings – we agree on something and it goes. Or we disagree and somebody makes the call. And so, so the decision-making process was – was quick.' | Transcript 5 (decision-maker)<br>Transcript 11 (frontline HCW)<br>Transcript 1 (decision-maker) |
| 2. Improved mutual trust between front liners and top management | ' There seemed to be…probably more teamwork. And there seemed to be a lot more admiration for each other. Yeah, and I think – and that – and it was expressed to me by Doctor ___ [Leader] 1 day, and I remember the conversation. He said, 'you know, I can't believe that these guys kept turning up.' You know? [Interviewer: Uhum] And ah, and I – I think we grew a bit of mutual respect for each other, out of the way we handled that, to be honest.' | Transcript 15 (frontline HCW) |
| Factors inhibiting outbreak control | | |
| 1. Logistic barriers to promptly implement the escalation plan | 'We have implemented it (means the IDEP escalation plan) on time, but for example to close the ED it took us time to evacuate it…. the positive cases increased and we were moved from stage to stage….' | Transcript 1 (decision- maker) |

Continued

**Table 2** Continued

| Study themes/subthemes | Quotes | Interview no (interviewee level) |
|---|---|---|
| 2. Poor staff orientation and management ambiguity | 'I was kept very much in the dark as to what was going on…it wasn't transcribed. We were – we were not – we were only…only fed information that we needed to know. So, rather than team debriefing every day, which I would have appreciated, that didn't (happen)…So poor communication. And it – it – almost a hierarchy of who needs to know what. And yet, we were in the frontline.' | Transcript 1 (frontline HCW) |
| | 'Well, there was lots of grey… grey areas….Ah, would you put a mask ah, throughout the stay, in the aisle – hospital, ah, in the corridors? Would you not do as some people ah, did? … some people did not ah, do that. There were lots of mixed messages coming from even IPC department. …… Ah, which confused us, which… ah, and so there was lots of variations…some people were more conservative. Some people more – were more liberal in doing these things.' | Transcript 12 (frontline HCW) |
| | ' A clear example is dealing with visitors and dealing with the military people…who control the visitors here. And there was a clear miscommunication and … misunderstanding. You come to them and say, 'Why did you let them (visitors) in?' You know? They are not really getting it. Ah – I'm – I'm sure. I'm sorry to say that, but that's – that's was one of the biggest challenges I think. So they were not getting it and it – the higher – the administration …. ranks of the military, was not really getting it. Although they were … part of the command center.' | Transcript 3 (decision- maker) |
| 3. Negative media commentary | ' …The social media put a huge amount of pressure. And of course…some of it … on reasonable facts and the others are myths basically. Lots for example of talk, of people dying from …. from the health workers. Of course I mean that created pressure. [… for example I mean had one of our, one of the Chairmen and one of the infection control leaders who, were tested positive but they were basically asymptomatic, but … what happened in the media (reported they) had died…!' | Transcript 5 (decision-maker) |
| | '….We could have done better with the media, I felt very vulnerable, actually.…I felt very vulnerable… And that was a huge burden for me….Big.' | Transcript 10 (decision-makers) |
| 4. Lack of appropriate staff counselling and mental health support | ' Dr. B…Whenever you see somebody sneeze you're cupping (hands over face). It was scary, stay away. Was just telling (another colleague) that my barber refused to get my hair cut.<br>Dr. C:….Even in social ah, aspects…the mosque next to my house, I usually go to pray when I like. One day he called me (means the Imam) when I was leaving and said 'You know, we know each other, we are very close neighborhood, so he said, you know the other neighbors……because of Corona…. so maybe you had better stay away'. | Transcript 2 (decision-makers) |
| Long-term institutional gains in response to the outbreak management | | |
| 1. Tangible improvement in IC practices | P4: I think that the organization has certainly matured. And they have a different outlook on… on the ED…From the MERS-CoV tragedy…I think that there was a huge wake-up call. And I think it was a steep learning curve through the organization. So they understand now that when ED says…the Chief Nurse or the CEO are receptive. | Transcript 13 (decision-maker) |
| | We – we had a lot of support from Infection Control department…lots of information available. Um, the Infection Control practitioners were on the units day and night, supporting the staff. Management as well….in terms of supplies, equipment, all of that, we didn't have any issues. It was supplied – readily available. | Transcript 13 (frontline HCW) |
| 2. Impetus for change in personnel and processes (transformation) | ' …the, the boarding and ah, boarding patients within the ED is not new, it's from 2005 to 2006. [Interviewer: Yes] but is getting … every year was getting worse……. From 170,… we have now 56 beds (means after the ED transformation), our efficiency and waiting times, improved significantly because the boarding patient reduced… So we know, for us it was very clear the issue wasn't within the department (ED department), it was within the flow of patients within the organization.' | Transcript 6 (decision maker) |
| | ' But we – just we completely redesigned – not only um, it was complete system – restructure and system redesign ….Um, people were practicing in a way that they've never done before – nurses and doctors….' | Transcript 14 (frontline HCW) |

ED, emergency department; HCW, healthcare workers; IC, infection control; IPC, infection prevention and control.

promote IC. This perceived poor communication created additional confusion that led to low coordination of IC instructions from bothIC and the nursing teams. Consequently, some health professionals, and other administrative and military staff, did not even appreciate the severity of the outbreak. Their consequent lack of attention to reducing the number of new patients and visitors entering the institution was seen to further elevate infection risk.

All participants referred to consistent and pervasive ***negative media commentary*** on the MERS-CoV outbreak occurring at the KAMC-R. This negative coverage contributed to significantly negative public perceptions of the Ministry, KAMC-R, its senior decision-makers and the frontline HCWs. These negative commentaries were evident across local mass media (television, radio and newspapers) and social media - particularly Twitter. The negative media reporting was cited as negatively impacting staff morale and affecting workers socially, psychologically, and mentally. During this challenging period, this compounded the negative effects of work demands. Reactive and poor media management by the KAMC-R was seen to contribute to the ongoing frequency and negativity of this commentary. Participants suggested that the institution should have a media centre to coordinate media coverage in such emergency circumstances (table 2).

Staff capacity to handle this challenging situation was further reduced given the perceived wide prevalence of high anxiety in staff due to the ***lack of appropriate staff counselling and mental health support***. The psychological demands on frontline health professionals escalated due to a range of coalescing factors; most notably the need to manage the outbreak simultaneously with the closure of most of the institution's units, combined with the negative media commentary. Almost all frontline participants strongly and repeatedly expressed the need for counselling and mental health support of employees.

## DISCUSSION

Learning from crises helps foster systems improvements.[17] However, learning from major events is challenging because each event is comparably rare and occurs in a distinctive context. As these events are also complex,[18] qualitative as well as quantitative research[10] is useful for generating insights and lessons to inform future outbreak control.[18]

Useful lessons gleaned from this study of MERS-CoV crisis management (table 3) concur with other research. It is not just the actions of HCWs and decision-makers that contributed to successful management, but also the mutual trust that accrues via the delegation of responsibilities, team management, coordination, tasks distribution, role clarification and communication.[19 20] This reflects the practice of collective leadership—defined as 'a dynamic leadership process in which defined leaders, or set of leaders, selectively utilize skills and expertise within a network, effectively distributing elements of the leadership role as the situation or problem at hand requires'.[21] This research corroborates other work identifying that a number of different strands of management contribute to success, particularly, the benefits of centralised yet inclusive meetings during which senior decision-makers and frontline HCWs share knowledge and learning[22] from different parts of the organisation.[23–25] Other key lessons arising from this study arose from the weaknesses around the media management during the outbreak which in turn adversely affected reported staff morale and anxiety.[26] Such challenges are not unusual.[27] Large health institutions managing major crises should have a dedicated media centre or representative capable of implementing a well-designed and coordinated media crisis plan to aid communication, address questions and proactively act to protect the reputation of the organisation and its staff.

Mental health support to frontline HCWs was a major missing element in managing the MERS-CoV outbreak. Indeed, psychological and personal support and counselling for staff during emergency situations is recommended.[28–30] In Singapore for example, the Ministry of Health funds a 'comprehensive crisis response management system' for health professionals.[28] Such initiatives may be more effective in supporting staff than support from other health professionals[29] and can be targeted to those in most need via screening.[29 30]

While the themes presented are not uncommon in organisation studies of infection outbreaks,[31 32] these

**Table 3** Lessons learnt from the management of the MERS-CoV outbreak

| | |
|---|---|
| 1 | Inadequate facility readiness to implement IPC guidelines and poor IC practices may lead to an outbreak situation. Strict implementation and monitoring are mandatory regardless of the volume of work. |
| 2 | Patient boarding in ED should follow the internationally accepted figures regardless of the number boarded. |
| 3 | Collective leadership is the management method of choice when dealing with a multidimensional leadership crisis. |
| 4 | In national level crisis management, media centre and a pre-existing media disaster plan are mandatory to reduce HCW anxiety and improve trust in the institution and its staff. |
| 5 | HCW mental healthcare and anxiety relief are important factors to increase resilience and cooperation within the workforce. |
| 6 | Despite the immediate consequences of a healthcare crisis, it can represent a strong drive for change and institutional reform. |

ED, emergency department; HCW, healthcare worker; IPC, infection prevention and control; MERS-CoV, Middle East Respiratory Syndrome caused by a coronavirus.

reflected our data and, as studies and systematic reviews indicate concur with other accounts of major outbreaks such as ebola.[31–33] As such, our findings reiterate the imperative of addressing these transcending aspects across different types of infection outbreaks.

### Research limitations and strengths

This research documented learning from an unusual, burdensome and serious infection outbreak and used methods recognised to be well suited to explore the complexities of outbreaks.[31 32] Similar to other 'rapid' qualitative accounts of major outbreaks with high mortality notably ebola,[31] this study addresses key interdisciplinary aspects of perceived outbreak causes, infrastructure, IC, facilities and health needs.[32] Unlike this previous work, the rigour of this study was increased via comprehensive details of the sample, participants and context.[32] As with other studies,[32] participants included in the study were very well-placed to provide insights into the outbreak but inevitably then the research was also conducted retrospectively, was based on subjective data, and involved a select group of participants whose perspectives may differ from the broader population. As with other studies,[32] while independent researchers undertook the interviews, responses may have been influenced by perceived 'official' links between the project and the organisation. Staff perspectives may have also been influenced by the time duration since the outbreak was curtailed (around 8 months). We addressed these limitations through different data collection sources, member checking and data triangulation.

## CONCLUSION

Management of the MERS-CoV outbreak at KAMC-R was widely recognised by staff as a serious outbreak of local and national significance. While the outbreak was controlled successfully in 6 weeks, progress in management was inhibited by a lack of institutional readiness to implement IC measures and reduce patient flow, low staff morale and high anxiety. Effective management was promoted by greater involvement of all staff in sharing learning and knowledge of the outbreak, developing trust and team work and fostering collective leadership. Future major IC crises could be improved via measures to strengthen these areas, as well as better coordination of media management and proactive staff counselling and support.

**Author affiliations**
[1]Department of Medicine, King Abdulaziz Medical City, Riyadh, Saudi Arabia
[2]College of Medicine, King Abdulaziz Medical City and King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia
[3]College of Public Health, King Abdulla International Research Center and King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia
[4]Department of Pediatrics, King Abdullah International Medical Research Centre and King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia
[5]Faculty of Nursing, University of Alberta, Edmonton, Alberta, Canada

**Acknowledgements** The authors do acknowledge the King Abdullah International Medical Research Center for funding this manuscript.

**Contributors** BAAK: Initiated the research idea, contributed to proposal writing, contributed to data collection, validated data analysis, contributed to final manuscript writing, read and approved the final manuscript. HMFA-K: Contributed to research proposal writing, to data collection and analysis, contributed to final manuscript writing, read, proofed and approved the final manuscript. ME: Contributed to research proposal writing, contributed to data collection and contributed to final manuscript writing. YA: Validated data analysis, read and approved the final manuscript. HHB: Validated data analysis, read and approved the final manuscript. AC: Contributed to data collection and analysis, contributed to final manuscript writing, read, proofed and approved the final manuscript.

**Funding** King Abdullah International Medical Research Centre (RC16\131\R) fundedthe research.

**Competing interests** None declared.

**Patient consent for publication** Not required.

**Ethics approval** The King Abdullah International Medical Research Center approved the research and funded the data collection and analysis, RC 16-131/R, 2016. The Institution Review Board (IRB) at the Ministry of National Guard Health Affairs approved the research proposal.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data sharing statement** No additional data are available.

**Author note** Agree on the data mentioned



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